HORTICULTURAL ABSTRACTS

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Initialled abstracts not by Bureau staff are by A. E. Flood, R. V. Harris, M. M. Macneill and H. B. S. Montgomery of the East Malling Research Station.

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SALIENT ITEMS. Vol. 26. No. 2.

DISEASE AND PEST CONTROL.

Fungus diseases:—New troubles are discussed in two papers (1561, 1564), and new methods of combatting old ones in four others (1562, 1633, 1712, 1770). With one fungus a relationship has been established between sunburn and infection (1576) and with another between resistance to infection and pectin esterase activity (1772).

Virus diseases:—The prominence of the tobacco plant in virological research remains unchallenged. Susceptibility and virus multiplication are linked with its composition and nutrition (1884–1886), resistance to TMV may be increased by thiouracil (1887), and the same virus may be inactivated in tobacco plants by a variety of plant and fungous extracts (1889) and in tomato seeds by altering the method of storage (1823). Against a stone fruit virus antimetabolites, including thiouracil, also had some effect, but not enough to provide completely virus-free budwood (1540).

Insect pests:—Not all viruses, however, are harmful; one has been used in a spray to control the cabbage white butterfly (1715). Among more orthodox methods of control several different ways of applying systemic insecticides are reported (1594, 1687, 1997, 2277). Attempts are also being made to assess the degree of natural control and the losses through pests in unsprayed orchards of deciduous fruits (1621) and citrus (2101, 2116). Finally, if you want to know where a wireworm goes when it meets a soil insecticide, you can attach a radioactive wire to it and follow its movements (1700).

Mammals:—The rodenticidal effects of endrin (1620) and a new rabbit repellent (1618) may be mentioned. Readers in search of even bigger pests may care to glance at 2154 and 2155.

Nematodes:—Returning to the microscopic, two nematocides, one combined with a fungicide, seem to be beneficial when applied to strawberry plants (1580, 1581). Less conventional, but said to be 100% effective, is hydrogenated fish oil used against the burrowing nematode which attacks citrus (2115).

Soil sickness:—Complexities rather than cures form the subject of four papers (1521–1523, 2076).

GROWTH AND REPRODUCTION.

Light and temperature:—In recent years improvements in equipment and technique (e.g. 1362) have made possible an ever expanding volume of research on the effects of light and temperature on

vegetative growth and flowering. Further studies are reported on several separate, though interacting, aspects, of light, namely, photoperiodism (1804, 1985, 2024), intensity (1481, 2288) and wave-length or colour (1325, 1805). Light interacts with temperature in controlling seed germination (1324), growth (1326), flowering (1698, 1979) and in promoting certain physiological disorders (1970). Two reviews devoted wholly or largely to light may also be mentioned (1323, 1327).

Water:—Although water is as much a primary factor in plant growth as light and temperature it seems by comparison to have the rather bedraggled appearance of a scientific Cinderella. However, there are a few papers which hint at interesting possibilities. One suggests differences between mature and young leaves in their ability to make good transpiration losses (2180), and another differences in transpiration rates between plants in the vegetative and reproductive phases (2223). A third paper indicates that flower initiation in sugar cane, which is known to be dependent on photoperiod, can be prevented by withholding water (2270). Finally, studies on pears indicate that leaves and fruits may show wide differences in osmotic pressure during periods of water stress (1532).

Intra-plant antagonisms:—In addition to the competition between plant organs for water just mentioned, reference may be made to a case in which flower initiation was promoted in peas by stopping vegetative growth (1328) and to the failure in apples of flower buds to form on spurs in close proximity to developing fruits (1434).

Growth substances:—Auxin inhibits flowering, if applied before the translocation of the flowering stimulus from the leaf is complete, but promotes flowering as soon as this process has been completed (1341). The juvenile phase in plants may also be altered by applying auxin (1709) or a seed extract (1740). In concentrations which stimulate root growth both auxins and anti-auxins would appear to produce identical physiological reactions (1339). In pineapples beta-hydroxyethylhydrazine induces early flowering, although it does not possess a structure characteristic of growth substances (2226). The natural occurrence of the hitherto synthetic inhibitor isonicotinic hydrazide in a plant may also be recorded (2128).

MACHINERY AND EQUIPMENT.

Field machines and implements:—General developments are reviewed in articles from Holland (1360) and Britain (1361), and there are also surveys of machines available for hedge maintenance (1365) and for planting bulbs (1994). Among individual new units are a drill attachment for the band placement of soil conditioners (1364), a bulb lifting machine (1995), mechanical harvesters for cucumbers (1725) and olives (2141), and straddle trucks for hauling fruit boxes from orchard to packing house (1450). Machines and accessories under test include fertilizer distributors (1363), sprayer pumps (1369), an air blast nozzle (1370) and a wind machine for frost protection (2091).

Apparatus and techniques:—A general account of new irrigation equipment (1366) may be supplemented by observations on water distribution under trickle irrigation (1816) and by an account of methods of ridding drip-feed irrigation lines, used in hydroponics, of mucus-forming bacteria (1817). Perlon netting may facilitate the training of glasshouse cucumbers (1723). Research aids include soil moisture meters (1367, 1368), aerated washing apparatus for seeds or tissue discs (1372), apparatus for grinding small quantities of fresh leaves (1373) and equipment for collecting pollinating insects (2214).

Packing and processing:—Developments are reported in the packing and handling of apples (1454), cauliflowers (1717, 1718) and lettuce (1793, 1794). An unusual phenomenon occurs when kola nuts are packed in sealed polythene bags; vacuum develops which provides good protection against weevil attack (2302, 2303). For tobacco there is a new hot-air chamber (1879) and also equipment for flue-curing (1880), and for tea a rotary drier (2298). For ramie and kenaf fibres a small field harvester-ribboner with a degumming unit may be the answer to a problem of long standing (1929).

PLANT NUTRITION.

Absorption and translocation:—Tests on citrus seedlings have shown that all parts of the tree are able to absorb N and P (2079). Studies on epiphytes suggest, however, that the type of growth produced by foliar nutrition differs from that produced by root nutrition (2022). In sugar cane uptake of P by the roots is dependent on temperature and plant size rather than on the amount of P in the nutrient solution (2266). In tomatoes cation uptake, which is paralleled by electrical conductance, fluctuates diurnally (1806). With figs foliar-applied P is not absorbed by immature leaves but is absorbed in considerable amounts during a 6-week period starting in mid-May (1443). With vines the absorption of foliar-applied K may vary greatly from one plant to another (1500). Once inside the plant, N remains in such a state of flux as to suggest that, at least in sugar cane, diagnostic analysis may have to be based on intra-plant gradients rather than on any single tissue (2264). A review on the distribution of mineral elements during the development of plants may also be mentioned (1304).

Deficiency symptoms:—These are described for various plants (1695), for fruit plants in general (1515), for apples (1516), and for sugar cane (2262).

Minor elements:—Methods are described for determining iron chelates and iron in plants (1307, 1308), and studies are reported on the effects of glass frit on the iron and manganese nutrient status of tomatoes (1809) and on the effects of iron supply on the chelating action of wilt toxins (1820). In peaches a case is reported in which zinc-deficient leaves contained excess K (1520), while in tomatoes radioactive zinc has been used in translocation studies (1812). Avocado seedlings have shown a growth

response to chromium (2058). A review of the literature on cobalt suggests that it has no beneficial effect on growth but may often be harmful (1306).

PLANT PROPAGATION.

Seed:—We may just possibly not be alone in having failed to notice that new international rules for seed testing came into force in 1954 (1682). Among other papers on seeds reference may be made to a comprehensive study of vegetable seed storage (1684), the use of silicones to facilitate the passage of pea seeds through a drill (1739), and an observation that desiccation of tea seeds is followed by spiraling of the roots and shoots of the seedlings (2286).

Cuttings:—The importance of the medium used for callusing or rooting cuttings is indicated in two papers on quinces (1409, 1410) and one on woody ornamentals (1964), and the latter also suggests a relationship between temperature and type of root system developed. A simplified method of rooting single-leaf cuttings under polythene is to lay the film directly on the leaves and weight down the edges (2172). Good results are claimed for an air-cooled, polythene-enclosed mist-chamber in striking cuttings of apples, cherries, chrysanthemums and carnations (1408) and also for a method in which the bases of softwood cuttings are kept immersed in a nutrient solution (1965).

Rootstocks and scions:—The vigour of apple rootstocks is directly related to net assimilation rates (1416) and the various clones differ in their response to soil temperature (1417). All pear-quince unions show some anatomical evidence of incompatibility (1419). In citrus the ability of different stocks to affect the mineral composition of scion leaves appears to be related, in part, to the cation exchange capacity of root surfaces (2077).

POLLINATION AND FRUIT SET.

Deciduous fruits:—Various aspects of pollen collection and germination and of nectar secretion and insect attraction are dealt with (1422–1429). In figs the consumers' desire for seedy fruits can be met by inducing the formation of unfertilized "seeds" with the aid of benzthiazolyloxyacetic acid (1441).

Other crops:—In the avocado pollen production varies with environment (2061) and fruit set with night temperature (2060). Temperature also affects pollen viability in cucumbers and eggplants (1724). In tobacco radioactive phosphorus has been used to trace pollen-tube penetration of the styles (1843).

MISCELLANEOUS.

Anti-cancer factor in figs?—Small, faintly radioactive bodies (1915).

Cultivation depth:—Regular cultivation 3 inches deep may be very detrimental to beans (1749) but has little effect on the feeder roots of citrus (2080).

Describing apple varieties:—With the aid of 157 characters (1400).

Freezing of plant tissues:—Observed and recorded by cinemicrography (1530).

Grassing down small fruits:—Successful for black currants and raspberries (1469).

Laboratory needs:—A pilot survey of space and services (1291).

One thing less to worry about:—Orientation in the transplanting of trees (1436).

Onion sprouting:—Controlled with various forms of atomic irradiation (1775).

Paint troubles:—Caused by PCP-based paints used in glasshouses (1639).

Smog:—Produces in spinach leaves a substantial increase in the formic acid content (1535).

Texture in fruit and vegetables:—Chemical factors discussed with particular reference to lignin (1703).

What to do with the newspaper:—Read it perhaps, but in any case soak it, shred it and use it as a mulch (1667).

MISCELLANEOUS.

General.

(*See also* 1374k, m, t, v, w, z, 2309, 2311, 2312, 2314, 2318, 2320, 2321, 2323-2327, 2329, 2333, 2334, 2340c, d.)

1286. U.S. Department of Agriculture.
The Agricultural Research Center of the United States Department of Agriculture.
Agric. Handb. U.S. Dep. Agric. **43**, revised 1955, pp. 52, illus., Supt. Documents, U.S. Govt. Printing Office, Washington 25, D.C., 25c.

A brief account is given of work being done at Beltsville, Md. The establishment includes a horticultural crops research branch.

1287. Rosewarne (N.A.A.S.).
Station Guide Rosewarne Experimental Horticulture Station, 1955-56, Cambourne, Cornwall, pp. 46.

Soft fruits are included as part of the National Fruit Trials, and brassica varieties are studied belonging to the N.I.A.B. trials. Other experiments in progress include those on the cultivation of brassicas, narcissi, tulips, anemones and gladioli, and on the use of Dutch lights and cloches.

1288. State Board of Plant Culture, Denmark.
Danish State Experiments and Research in Plant Culture, Copenhagen, 1949, pp. 13, illus.

The history and scope of agricultural and horticultural experiment stations and laboratories in Denmark are outlined. The location of each centre is stated with a brief indication of crops studied.

1289. Araújo, J. E. G.
O Instituto Agrônomico do Sul: organização e trabalhos. (The Agronomic Institute of the South: its organization and activities.)
Bol. téc. Inst. agron. Sul, Pelotas **9**, 1954, pp. 44.

The Institute is responsible for agricultural research in the 3 southernmost States of Brazil and has 5 research stations under its charge, namely, at Pelotas and Passo Fundo in the State of Rio Grande do Sul, at Rio Caçador in Santa Catharina and at Curitiba and Ponta Grossa in Paraña. Brief notes are given on aims, organization, personnel and the research work being conducted by the various departments of the Institute and the research stations. The crops being investigated are vegetables, deciduous fruits, nuts, soft fruits, vines, capsicums, citrus, olives and persimmons.

1290. Hodge, W. H., and Erlanson, C. O.
Plant introduction as a federal service to agriculture.
Adv. Agron., 1955, **7**: 189-211.

The author sketches the origin of the Section of Plant Introduction and describes its organization. He describes methods of procuring plants, inspecting them and bringing them through quarantine. Their propagation, testing and distribution follow through the State-Federal Cooperative Plant Introduction Stations at Geneva N.Y., Experiment Ga, Ames Iowa, and Pullman Wash., or in some cases through the Federal Plant Introduction Gardens at Glenn Dale Md, Barber Lathrop near Savannah Ga, Coconut Grove near Miami Fla. and Chico in the irrigated Sacramento Valley of northern California. Among tree fruits which were originally introduced thus to the U.S.A. are the Washington navel orange from Brazil, avocado, date, lychee, Quetta nectarine, Meyer lemon, Geneva apricot, Shalil and Yunnan peaches, Methley plum, Chinese hairy chestnut and pistachio.

1291. Davies, R. L., Nightingale, J. W., and Bailey, N. T. J.
Survey of space and services requirements in two agricultural research laboratories.
Nature, 1955, **176**: 999-1001, bibl. 2.

Results are given of a pilot survey of the use made of space and services by scientific workers in laboratories of the Agricultural Research Service.—Division for Architectural Studies, Nuffield Foundation, London.

1292. Samuel, L. E.
The state of agriculture in Israel.
World Crops, 1956, **8**: 22-5, illus.

Information is given on production of citrus and other fruits, olives and vegetables, on the value of citrus exports and on Government control of crop prices.

1293. Anon.
South African agricultural developments.
World Crops, 1956, **8**: 20-1, illus.

Notes are given on deciduous fruit production for the local and export markets, on citrus production and exports, and on sugar production.

1294. Riemann, F.
Postwar development in West German agriculture.
World Crops, 1956, **8**: 15-20, illus.

Includes statistics on areas under horticulture, viticulture and vegetables; and vegetable prices.

1295. Humphrey, N.
Agricultural development in St. Helena.
World Crops, 1956, **8**: 12-14, illus.

New Zealand hemp is the staple export crop. Other export crops now being fostered are vegetables, lily bulbs and coffee.

1296. de Fellner, C.
Yugoslav agriculture, 1954.
World Crops, 1955, 7: 469-72, 499.

Crops, yields of top fruits and vines in 1953 and 1954, taxation, private and collective farming.

Climatic factors.

(*See also* 1390, 1526-1536.)

1297. Ministry of Agriculture, London.
Weather and the land.
Bull. Minist. Agric. Lond. **165**, 1955, pp. 35, illus.

This bulletin should help those whose work is largely controlled by the weather to understand and supplement the official weather forecasts issued by the Meteorological Office. The common manifestations of weather occurring in the British Isles are discussed, and meteorological terms and charts are simply explained. The modifying effects of geographical features and of some agricultural and horticultural practices are then discussed. Advice is given on forecasting or interpreting the forecast by observation of local weather conditions. Finally the services made available to the public and to farmers by the Meteorological Office are indicated.

1298. Pessi, Y.
Pystysuorasta lämpötilan jakaantumisesta maan pinnasta ylöspäin ja sen merkityksestä hallantorjunnassa. **(Vertical measurement of temperature from the soil surface upwards.)** [English summary 6 lines.]
Maataloust. Aikakausk., 1955, **27**: 154-60, bibl. 8, illus.

Measurements of the air temperature were taken from ground level upwards during frosty nights. In midsummer differences in air temperature at different levels were so great that it was possible to prevent frost injury by transference of warmer air from above downwards. Temperature differences were much smaller in the autumn.—Frost Res. Stat., Pelsonsuo.

1299. Oddie, B. C. V.
Rain-making.
Agriculture, Lond., 1956, **62**: 512-15.

A brief account is given of cloud-seeding tests with silver iodide carried out on Salisbury Plain in 1955. Generators were made from a brazier's kerosene-burning blowlamp, modified so that a solution of silver iodide in acetone is fed to the flame at a controlled rate. The series of tests is not complete and results have not yet been assessed.

1300. Glover, J., Robinson, P., and Taylor, J.
Assessing the reliability of rainfall if monthly falls are not independent.
J. agric. Sci., 1955, **46**: 387-8, bibl. 3.

Glover and Robinson [*J. agric. Sci.*, 1953, **43**: 275-80] showed that for practical purposes the rainfall at a station in any month of the year can be assumed to be normally distributed, and that the probability of the rainfall being above a certain minimum value (selected with regard to crop requirements) can be calculated accordingly. If the rainfall in any one month is distributed independently of the rainfall in other months of the year or season, then the probability of a pattern of rainfall month by month can be calculated by multiplying the several probabilities of the individual months. It was suggested that, in general, this was sufficient; but a method was given for obtaining the probability of a given pattern when association existed between the different months. The method proved to be incorrect and another is presented. It is thought, however, that large correlations are unlikely to exist in practice between the rainfalls of neighbouring months, and that the method should therefore be unnecessary. —E.A.A.F.R.O., Muguga, Kenya. [See also *H.A.*, 24: 2189.]

Economics.

(*See also* 1386, 1387, 1855, 1957, 1958, 2148f, t, u.)

1301. Storck, H.
Die Kapitalverhältnisse im Gartenbau. Wege ihrer Erfassung in verschiedenen europäischen Ländern. (**The use of capital in horticulture. Methods of collecting data in several European countries.**)
Gartenbauwiss., 1955, **2**: 197-231, bibl. 22.

The author surveys the use of capital in German, Danish and Dutch horticulture, and the different methods of collecting data which were used in each country. The data are tabulated, giving some idea of the capital employed in horticultural holdings and the differences in use of capital according to the size and type of holding.—Inst. gärtn. Betriebslehre, techn. Hochsch., Hannover.

1302. Waugh, F. W.
Graphic analysis in economic research.
Agric. Handbook agric. Mktng. Serv., U.S. Dep. Agric. **84**, 1955, pp. 63, bibl. 25.

A review is presented of some of the graphic analyses that are useful in economic agricultural research, for example, frequency distributions, trends, cycles, seasonal variation and comparison of time series.

Biochemistry.

(*See also* 1374c, 1375b, 2316.)

1303. Pienaar, W. J.
The quantitative spectrographic analysis of plant material with the aid of the direct current arc.
Sci. Bull. Dep. Agric. S. Afr. **355**, 1955, pp. 16, bibl. 12, illus., being *Fruit Res. Ser.* **39**, 3d.

A spectrographic method for the quantitative determination of K, Ca, Mg, Na, Mn, Fe and Cu in plant material without chemical preparation of the plant ash is described. Lithium carbonate is used as a spectrographic buffer. Small concentrations of Rb, Sn and Cr incorporated in a graphite dilutant serve as internal standards. The reproducibility of the method is good, and the percentage standard deviation for all seven elements is less than $\pm 6\%$. [Author's summary.]

1304. Williams, R. F.
Redistribution of mineral elements during development.
Annu. Rev. Plant Physiol., 1955, **6**: 25-42, bibl. 57.

In this review the author emphasizes that he is "primarily concerned with the demonstration and explanation of net losses of mineral elements from specific plant parts".

1305. Fries, N.
The significance of thiamin and pyridoxin for the growth of the decotylised pea seedling.
Physiol. Plant., 1955, **8**: 859-68, bibl. 11.

In a sucrose-mineral-salt medium supplemented with arginine, glycine and adenine, the 2 vitamins thiamin and pyridoxin represent the chief limiting chemical factors for the growth of decotylized pea seedlings in darkness. [From author's summary.]—Inst. physiol. Bot., Univ. Uppsala.

1306. Young, R. S.
Cobalt in biology and biochemistry.
Sci. Progr., 1956, **44**: 16-37, bibl. 112.

In the section on cobalt in plants it is stated that the quantity of cobalt found in plants is dependent not only on the amount of this element in the soil but also on factors such as type of soil, moisture, aeration, temperature, soil reaction, variety of plant, soil microflora, quantity of colloidal matter, presence of other ions in soil solution, stage of plant growth, and many other variables. The cobalt contents are given for a number of plants including top fruits, grasses, vegetables, walnuts and coffee beans. In general, the leafy parts have a higher concentration than fruits, seeds or roots. Some workers have found that applications of liming materials reduced the availability of soil cobalt to plants. Cobalt does not appear to have any beneficial effect on plant growth. On the contrary, there is considerable evidence that quite minute quantities may be deleterious to certain species.—Internat. Nickel Co. of Canada.

1307. Hill-Cottingham, D. G.
Spectrophotometric determination of iron chelates.
Analyst, 1955, **80**: 906-8, bibl. 3.

In the preliminary report on this method [see *H.A.*, 25: 1243] it was stated that for solutions of the chelate between ferric iron and N-hydroxyethylethylenediaminetriacetic acid the absorption of ultra-violet light at 245 mμ was proportional to the concentration of chelated iron present. This work was done in neutral solution, but it has since been found that the peak at 262 mμ in acid solution is better suited for quantitative determinations. As many substances absorb ultra-violet light of wavelengths about 260 mμ, the method is best applied to pure solutions of the iron chelates but,

with discretion, it can also be used successfully for mixtures with which the source of interference can be compensated by an additional spectrophotometric reading. For example, with plant-nutrient culture solutions, iron chelates being used as the sole source of iron, the spectrophotometer readings with (1) culture solution plus Fe-EDTA containing approximately 5 p.p.m. of iron, (2) culture solution without iron and (3) pure Fe-EDTA containing approximately 5 p.p.m. of iron were 1·005, 0·025 and 0·985 optical densities respectively.—Long Ashton Res. Stat.

1308. Nicholas, D. J. D., Lloyd-Jones, C. P., and Fisher, D. J.
Some problems associated with determining iron in plants.
Nature, 1956, **177**: 336-7, bibl. 5.

It is well known that the total iron content of leaves determined by chemical methods seldom reflects the true iron status of plants. Various workers have shown that the iron determined by leaf analysis is considerably less after washing the leaves either in water containing a detergent or in dilute hydrochloric acid. This difference has been assumed to result from the removal of iron contamination on leaf surfaces, although it has not hitherto been determined whether or not iron is leached from the tissues during leaf washing. The authors' experiments have shown that iron is a serious contaminant on the leaves of tomato grown in a glass-house, and that it may be readily removed from the external surfaces only by washing the plant in water containing 0·3% detergent. It has been suggested that the adsorption of iron on silica and the formation of soluble iron complexes during acid digestion interferes seriously with iron analysis of plants. In these experiments, however, tracer and non-radioactive iron were recovered fully when added at various stages during acid digestion of different dried plant materials. Futher, in tomato plants containing radioactive iron there was no indication that the iron content of acid digests of plant 'tops' determined chemically by α-α-dipyridyl was less than that determined by the tracer method, thus demonstrating that soluble iron complexes, even should they be formed during acid digestion, did not interfere with the determination of iron in tomato.—Long Ashton Res. Stat.

1309. López Arana, M.
Determinación de magnesio por medio de fotómetro de llama en muestras de tejidos vegetales, suelos y aguas. **(Magnesium determination by flame photometer in samples of plant tissues, soils and water.)**
Bol. inf. Colombia, 1955, **6**: 366-79, bibl. 12.

A method is described which involves the use of a phototube to increase sensitivity and of oxyacetylene as the gas.

1310. Webster, G. C.
Nitrogen metabolism.
Annu. Rev. Plant Physiol., 1955, **6**: 43-70, bibl. 148.

Since the publication of a previous review on this subject in Volume 4, more information has been obtained on the biochemical pathway of N metabolism. The author discusses 4 aspects of the problem, namely nitrate reduction, amino acid metabolism, amide and peptide bond synthesis and protein synthesis.

1311. Webster, G. C., Varner, J. E., and Gansa, A. N.
Conversion of carbon-14-labelled urea into amino acids in leaves.
Plant Physiol., 1955, **30**: 372-4, bibl. 8.

The incorporation of the carbon of urea-C^{14} into amino-acids has been demonstrated in bean leaves. The pattern of incorporation was essentially the same as that of the carbon of labelled sodium bicarbonate. —Calif. Inst. Technol., Pasadena.

1312. Rogers, B. J.
Incorporation of radioactive acetate and sucrose into amino acids and protein of excised organs of red kidney bean.
Plant Physiol., 1955, **30**: 377-9, bibl. 15.

Experimental data have shown that incorporation of amino acids proceeds at a considerably greater rate into protein of excised roots than into protein of excised leaves. In so far as incorporation may be said to be synthesis, it seems possible that the decrease in protein content of detached leaves is due, in part, at least, to a lower rate of protein synthesis.—Calif. Inst. Technol., Pasadena.

1313. Bernheimer, A. W., and Steele, J. M., Jr.
Ribonuclease and ribonuclease-inhibitors among higher plants.
Proc. Soc. exp. Biol. Med., 1955, **89**(1): 123-6, from abstr. in *Biol. Abstr., Sect. D*, 1956, **30**, No. 2791.

Of 41 plants tested, 5 (*Phlox* sp., *Lathyrus* sp., *Asclepias syriaca*, *Allium* sp. and *Yucca filamentosa*) were found to contain a substance capable of degrading ribonucleic acid, and these plants appear to constitute new sources of ribonuclease. A new, naturally occurring inhibitor of pancreatic ribonuclease is shown to be present in lilac leaves. An apparently similar substance is present also in privet leaves. The agent present in lilac inhibits not only pancreatic ribonuclease but also *Asclepias* ribonuclease, and to a lesser extent *Lathyrus* ribonuclease.

1314. Evans, H. J.
Studies on cytochrome reductase in higher plants.
Plant Physiol., 1955, **30**: 437-44, bibl. 24.

Among plants showing cytochrome reductase activity in young leaves were lima and snap beans, tomato, tobacco, broccoli, cucumber and peach.—N.C. St. Coll., Raleigh.

1315. Gibbs, M., Earl, J. M., and Ritchie, J. L.
Respiration of the pea plant. Metabolism of hexose phosphate and triose phosphate by cell-free extracts of pea roots.
Plant Physiol., 1955, **30**: 463-7, bibl. 26.

Cell-free extracts of 12 to 15-day-old pea roots were studied and the enzymes present were determined. The results indicated the existence in pea roots of pathways of carbohydrate metabolism. With one exception, the individual enzymes of the pea root appeared to have the same characteristics as those of the green leaf.—Brookhaven Nat. Lab., Upton, Long Is., New York.

1316. Rowan, K. S., Seaman, D. E., and Turner, J. S.
Phosphorylation as a possible factor in the Pasteur effect in plants.
Nature, 1956, **177**: 333-4, bibl. 8.

It has been suggested that the conservation of carbon by oxygen, which has been defined as the Pasteur effect, could be due to oxidative phosphorylation lowering the concentration of inorganic phosphate, or the ratio of adenosine di- to adenosine tri-phosphate, to levels which would limit the rate of glycolysis. A description is given of experiments on developing pea seeds in which the hypothesis was tested. It is concluded that the results reported are consistent with the hypothesis that on transfer from oxygen to nitrogen there is a rapid increase in concentration of inorganic phosphate and of the ratio of adenosine di- to tri-phosphate. This could give rise to an increased glycolysis, and so explain the Pasteur effect.—Bot. School, Univ. Melbourne.

1317. Jensen, W. A.
The histochemical localization of peroxidase in roots and its induction by indoleacetic acid.
Plant Physiol., 1955, **30**: 426-32, bibl. 8.

Peroxidase activity was localized and measured in 200-micron sections from the first 3 mm. of the primary root of *Vicia faba* after treatment with IAA. The cells of the root cap, proepidermis and vascular tissue showed peroxidase activity, but only cells of vascular tissue clearly showed induced formation of peroxidase. When supplied with eugenol and H_2O_2, cells showing peroxidase activity were able to produce a compound which appeared to be intermediate in lignin biosynthesis. The vascular tissue, which was high in induced peroxidase, was very active in lignin formation. —Calif. Inst. Technol., Pasadena.

1318. Varner, J. E., and Webster, G. C.
Studies on the enzymatic synthesis of glutamine.
Plant Physiol., 1955, **30**: 393-402, bibl. 30.

The enzyme catalysing the synthesis of glutamine from glutamate and ammonia has been obtained in a highly purified form from dried green peas. The method is described.—Calif. Inst. Technol., Pasadena.

1319. Mothes, K.
Physiology of alkaloids.
Annu. Rev. Plant Physiol., 1955, **6**: 393-432, bibl. 269.

The author reviews the literature on alkaloids under the following headings: formation of alkaloids in roots and shoots, translocation and partition, alkaloids in fruits and seeds, secondary chemical transformations, degradation and excretion, ontogenesis, external influences and alkaloid synthesis, mechanisms of biosynthesis, genetics, taxonomic significance and the role of alkaloids.

Physiology.

(*See also* 1374d, f, j, l, n, q, 1375a, d, 1481, 1804-1806, 1979, 2315.)

1320. Whittingham, C. P.
Photosynthesis.
Endeavour, 1955, **14**: 173-80, bibl. 18.

A review of some recent research on the successive steps in photosynthesis.

1321. Thomas, M. D.
Effect of ecological factors on photosynthesis.
Annu. Rev. Plant Physiol., 1955, **6**: 135-56, bibl. 69.

The factors considered are light and carbon dioxide, stomatal apertures, temperature, pH, mineral nutrition and age. Efficiency of photosynthesis and the use of photosynthesis in evaluation of the effect of fumigation of plants with toxic gases are also discussed.

1322. Shaw, M., and Maclachlan, G. A.
The physiology of stomata. I. Carbon dioxide fixation in guard cells.
Canad. J. Bot., 1954, **32**: 784-94, bibl. 17, illus.

The guard cells of *Tulipa gesneriana* were found to contain both chlorophylls *a* and *b*. By exposure to radioactive CO_2, followed by microautoradiography, selective CO_2 uptake in light was demonstrated in stomatal cells of *Allium*, *Hordeum*, *Nicotiana*, *Sedum*, *Tradescantia*, *Tulipa* and *Vicia*. A less intense uptake was observed in darkness with *Allium*, *Sedum*, *Tulipa* and *Vicia*. [From authors' summary.]—Univ. Saskatchewan, Saskatoon.

1323. Stoughton, R. H.
Light and plant growth.
J. roy. hort. Soc., 1955, **80**: 454-67, 494-506.

It is emphasized that in carrying out light experiments it is important to know the intensity of the light in terms of energy, its spectral composition, and its duration, including the duration of the associated dark period. The effects of light on seed germination, on growth including metabolic processes, and on development are surveyed. The practical application of light in horticulture is discussed.

1324. Toole, E. H., and others.
Interaction of temperature and light in germination of seeds.
Plant Physiol., 1955, **30**: 473-8, bibl. 9.

The effect of light and temperature on seed germination of *Lepidium virginicum*, *L. campestre*, *Sisymbrium officinale*, *Fragaria virginiana*, *Verbascum thapsus*, *Nicotiana tabacum* vars., and *Brassica juncea* vars. were studied. Germination was enhanced by exposure to red radiation and by a diurnal variation of temperature. A constant temperature above 30° C. was very unfavourable for germination. Seeds of *Lepidium virginicum*, imbibed in water and exposed to a period of high red radiation adequate for maximum displacement of the photoreaction, gave about 30% germination. By a change of temperature from 15° to 25° C., or by imbibing in 0·2% potassium nitrate, germination was increased to 88%. The effective temperature change could precede or follow exposure to light by as much as 20 hours. Holding imbibed seeds at 35° C. for 2 hours enhanced germination and affected the sensitivity of the photoreaction to radiation.—U.S. Dep. Agric., Beltsville, Md.

1325. Downs, R. J.
Photoreversibility of leaf and hypocotyl elongation of dark grown Red Kidney bean seedlings.
Plant Physiol., 1955, **30**: 468-73, bibl. 11, illus.

Dark Red Kidney beans were grown in complete darkness except for brief irradiations on the sixth, seventh and eighth days after germination, and were harvested on the tenth day. Short exposures to red radiation inhibited elongation of the hypocotyl, induced elongation of the leaves and caused the plumular hook to straighten. The effect of red radiation was nullified when immediately followed by a short exposure to far-red radiation. The ability of far-red radiation to produce flower initiation again in *Xanthium* was lost if the radiation was not applied within 30 minutes of the red interruption of the inductive dark period. The apparent loss of far-red control of hypocotyl and leaf elongation of dark-grown bean seedlings was comparatively slow. The regions of maximum effectiveness for regulation of hypocotyl and leaf length were about 6400 Å for the red action, and about 7300 Å for the opposing far-red action.—U.S. Dep. Agric., Beltsville, Md.

1326. DE CAPITE, L.
Action of light and temperature on growth of plant tissue cultures *in vitro*.
Amer. J. Bot., 1955, **42**: 869-73, bibl. 15, illus.

Tissue cultures of *Helianthus annuus* (crown-gall), *Parthenocissus tricuspidata* and *Daucus carota* were compared under varying conditions of light and temperature. It was concluded that growth of tissue culture *in vitro* was strongly influenced by temperature. The best growth obtained in natural light under greenhouse conditions took place at a day temperature (8 hrs.) of 26° C. and a night temperature (16 hrs.) of 20° C. At tissue temperatures above 26° C. growth is a function of light and temperature. Below 26° C. growth appeared to be a function of temperature. The optimum temperatures for growth of tissue cultures appeared to be higher than those for intact plants. In roots of carrot low temperature treatment induced anthocyanin formation in the proliferating callus as well as in the original cells of the transplants. First tissue transplants of carrot receiving low temperature treatment by water immersion developed a new, smooth, globular, compact callus, completely different from the one usually obtained without immersion.—Earhart Plant Res. Lab.

1327. LIVERMAN, J. L.
The physiology of flowering.
Annu. Rev. Plant Physiol., 1955, **6**: 177-210, bibl. 144.

New findings are discussed on the physiology of flowering, excluding vernalization, which have been published since an earlier review by A. Lang [*H.A.*, 23: 2448]. Evidence in the literature suggests that the reactions leading to floral induction are, in general, similar if not identical in long-day and short-day plants. The author divides the photoperiodic responses into several partial processes so that the responses of long-day and short-day plants may be compared. Under high-intensity light conditions the most important reaction is the photosynthetic fixation of CO_2. Other photochemical reactions important to the inductive process are a shift in equilibrium of the red-, far-red receptor pigment system to the far-red absorbing form, and a possible activation of IAA oxidase. When the plant is removed to darkness the pigment starts to return to the red-absorbing form, and there is also a continuing decrease in the leaf auxin level. It is suggested that at a critically low level of auxin there is a net appearance of florigen in the leaf, but there is also some evidence to suggest that auxin in some way causes inactivation of the florigen molecule. Once started, florigen synthesis continues until the optimum night length is reached; if light is then not given flowering is gradually reduced, the rate being dependent on the physiological age of the leaf and possibly also on the availability of energy-yielding substrates. Reactions taking place in the dark period are inhibited by a flash of red light given at an appropriate time. The author suggests that the net concentration of auxin depends on a balance between synthesis and destruction by the adaptive formation and de-adaptive destruction of IAA oxidase.

1328. HAUPT, W.
Förderung der Blütenbildung durch Hemmung der vegetativen Entwicklung. **(Promotion of floral initiation by inhibition of vegetative development.)**
Planta, 1955, **46**: 403-7, bibl. 8.

Young pea shoots treated as cuttings started floral initiation 1–2 nodes earlier than untreated controls. Initiation started at an even earlier stage in "second generation" cuttings taken from the shoot tips of the original cuttings. Leaf numbers to first flowers were also reduced by grafting young pea shoots on 6-week-old soya bean plants.—Bot. Inst., Univ. Tübingen.

1329. JAMES, W. O.
Plant mitochondria and respiration.
New Biol., 1955, No. 19, pp. 90-102, bibl. 4, illus.

The present flourishing state of the theory linking mitochondria with respiratory oxidation is due to the possibility of extracting and separating mitochondria in bulk. The most constant property of mitochondrial preparations is to oxidise succinic acid; oxidations of the Krebs cycle are also catalysed. Mitochondria can also promote phosphate transfers. It has been shown that ripe fruits of avocado accumulate some substance which affects mitochondria, promoting O_2 consumption and greatly reducing their phosphate transfer ability.

1330. POLJAKOFF-MAYBER, A.
Oxidative activity of particles prepared from lettuce seedlings.
J. exp. Bot., 1955, **6**: 313-20, bibl. 19.

Particulate fractions were isolated from lettuce seedlings germinated in water, and their oxidative abilities were investigated. The preparations had very high endogenous O_2 uptake. Maximum activity was found in 72-hour-old seedlings. Fatty acids inhibited the endogenous respiration, inhibition increasing with increased concentration. Coumarin and thiourea did not appear to have any direct effect on the respiratory enzyme systems. They apparently affect respiration of the whole seed only indirectly.—Hebrew Univ., Jerusalem.

1331. MIDDLETON, L. J.
Polyphenol oxidase in the respiration and the salt uptake of storage tissues.
J. exp. Bot., 1955, **6**: 422-34, bibl. 25.

Respiration and K uptake of beet and potato discs

were measured in the presence of protocatechuic acid. With beet, the acid (at 10^{-3} to 3×10^{-3}M at pH 6) was found to stimulate O_2 uptake and CO_2 output; this was accompanied by a reduction in K uptake.—King's Coll., Univ. London.

1332. MEIDNER, H.
The determination of paths of air movement in leaves.
Physiol. Plant., 1955, **8**: 930-5, bibl. 7, illus.

Two instruments have been described with which it is possible to assess qualitatively the paths of air movement available in a leaf. Results have been obtained with several leaves which indicate that the air space systems are not continuous in all leaves and that the degree of continuity of the air space system appears to be related to the total stomatal pore area per square millimeter as well as to the habitat of a plant. [Author's summary.]—Univ. Natal, Pietermaritzburg.

1333. HOPE, A. B., AND ROBERTSON, R. N.
Initial absorption of ions by plant tissue.
Nature, 1956, **177**: 43-4, bibl. 8.

A review is made of some of the experimental evidence on the subject and it is concluded that the hypothesis of a complex Donnan system can account for most of the observations on the initial absorption of ions by plant cells. In addition to this system, a process dependent on respiration must be postulated to explain the subsequent irreversible absorption (accumulation) probably into the vacuoles.—Plant Physiol. Unit, C.S.I.R.O., Bot. School, Univ. Sydney.

1334. KENDALL, W. A.
Effect of certain metabolic inhibitors on translocation of P^{32} in bean plants.
Plant Physiol., 1955, **30**: 347-50, bibl. 11.

In studies on the phases of metabolism most closely associated with the transport mechanism, a P^{32} solution was applied to one primary leaf blade of a bean plant, and its movement in the plant subsequently measured. Translocation of P^{32} was inhibited when dinitrophenol or sodium fluoride was placed near the phloem cells through which the transport occurred. There was little or no effect on P^{32} translocation from treatments with sodium fluoroacetate, 2,4-D, IAA or triiodobenzoic acid.—Ohio State Univ., Ohio.

1335. ADDICOTT, F. T., AND LYNCH, R. S.
Physiology of abscission.
Annu. Rev. Plant Physiol., 1955, **6**: 211-38, bibl. 148.

Results of work on abscission are presented and various hypotheses and theories are discussed. [See also *H.A.*, 25: 2356.]

1336. OSBORNE, D. J.
Acceleration of abscission by a factor produced in senescent leaves.
Nature, 1955, **176**: 1161-2, bibl. 10.

Agar blocks containing a diffusate from the pulvinus of *Phaseolus vulgaris* leaves were applied to the cut surfaces of explants from bean petioles. Diffusate from abscinded leaves accelerated abscission in bean petioles, but no comparable stimulation was observed with diffusate from very young leaves. In woody species tested a diffusate obtained from abscinded leaves stimulated abscission of attached green leaves. With the evergreen species used, only diffusate from leaves in their second and third years appeared to be active. The diffusible factor from senescent leaves of *Pyrus aria* and bean partially or wholly reversed the retarding effect of IAA on abscission.—A.R.C. Unit of exp. Agron., Univ. Oxford.

1337. KRAMER, P. J.
Water relations of plant cells and tissues.
Annu. Rev. Plant Physiol., 1955, **6**: 253-72, bibl. 122.

The author reviews recent papers on water relations in plants and concludes that "osmotic movement of water along diffusion pressure gradients accounts for most of the changes in water content of plant tissue".

Growth substances.

(*See also* 1327, 1374a, b, h, p, 1439-1441, 1499, weed and weed control section, 1709, 1773, 1774, 1807, 1903g, 1964, 2049, 2094, 2226, 2227.)

1338. REBSTOCK, T. L., AND OTHERS.
Inhibition of plant growth by 2-mercaptobenzimidazole analogs.
Plant Physiol., 1955, **30**: 382-4, bibl. 6, illus.

Several compounds related to benzimidazole were tested on bean for their growth inhibiting properties. The derivatives producing the greatest inhibition of new leaf growth were those which had chlorine substituted in the 5 position.—Mich. State Coll., East Lansing.

1339. AUDUS, L. J., AND DAS, N.
The interactions of auxins and anti-auxins in the stimulation of root growth.
J. exp. Bot., 1955, **6**: 328-47, bibl. 16.

Interactions of auxins and anti-auxins at growth-stimulatory concentrations have been studied using excised sections from the extension zone of pea roots. The curves relating growth responses to concentration for β-indolylacetic acid (IAA) and 3 anti-auxins, α-(1-naphthylmethylsulphide) propionic acid (NMSP), 1-naphthylmethylsulphide acetic acid (NMSA), and 4-chloro-3-nitrobenzoic acid (CNB), were very similar. A fourth anti-auxin, p-chlorophenoxy-iso-butyric acid (PCIB) showed little growth stimulation at any concentration. Consistent mutual antagonisms were found between stimulatory concentrations of IAA and the first 3 anti-auxins. Non-inhibitory concentrations of PCIB markedly antagonized stimulation by IAA. Similar mutual antagonisms were shown in various mixtures of 2 anti-auxins. It is suggested that both auxins and anti-auxins, in stimulating root growth, are exerting identical physiological actions in the same growth system.—Bedford Coll., Univ. London.

1340. BOLL, W. G.
Inhibition of excised tomato roots by sulfanilamide and its reversal by *p*-aminobenzoic acid and n-pteroylglutamic acid.
Plant Physiol., 1955, **30**: 161-8, bibl. 26.

Sulfanilamide inhibited growth of excised tomato roots grown in sterile culture, although stimulation was observed at low concentrations. Both *p*-aminobenzoic acid (PABA) and n-pteroylglutamic acid (PGA) overcame the inhibition. In the absence of sulfanilamide both PABA and PGA stimulated growth

of the main axis and laterals. [From author's summary.]—Univ. Texas.

1341. Salisbury, F. B.
The dual role of auxin in flowering.
Plant Physiol., 1955, **30**: 327-34, bibl. 30, illus.
Flowering in *Xanthium* was inhibited if auxin was applied before translocation of the flowering stimulus from the leaf was complete. When this process was completed, auxin application promoted flowering, and this effect acted independently of the leaf. When actively-growing buds were removed during or after induction, the dormant buds, on becoming active, remained vegetative.—Calif. Inst. Technol., Pasadena.

1342. Shantz, E. M., and Steward, F. C.
The identification of compound A from coconut milk as 1,3-diphenylurea.
J. Amer. chem. Soc., 1955, **77**: 6351-3, bibl. 13.
Compound A from coconut milk has been re-isolated and identified as 1,3-diphenylurea, identical with a synthetic sample in its physical, chemical and biological properties. In combination with casein hydrolysate, it promotes growth by cell division in cultures of carrot phloem tissue in a manner similar to coconut milk but to a lesser extent. The degree of response is variable, being dependent upon inherent characteristics of the individual carrot root from which the explants are taken. The chemical determination of the probable maximum level of anilide in a different sample of coconut milk is also reported. [Authors' summary.] —Bot. Dep., Cornell Univ.

1343. Kenten, R. H.
The oxidation of β-(3-indolyl)propionic acid and γ-(3-indolyl)-*n*-butyric acid by peroxidase and Mn^{2+}.
Biochem. J., 1955, **61**: 353-9, bibl. 15.
The oxidation of β-(3-indolyl)propionic acid (IPA) and γ-(3-indolyl)-*n*-butyric acid (IBA) was catalysed by highly purified horseradish peroxidase preparations in the presence of Mn^{2+}. It is suggested that hydrogen peroxide is formed as an obligatory intermediate.—Rothamsted exp. Stat., Harpenden, Herts.

X-ray effect.

(*See also* 1775, 1996, 2053v.)

1344. Riley, H. P.
The protective effect of various chemical compounds against damage to chromosomes by gamma radiation.
Amer. J. Bot., 1955, **42**: 765-9, bibl. 17.
Protection against X-ray damage to chromosomes, as measured by the frequency of chromosome interchanges and deletions produced in cells of onion root tips, is conferred by sodium sulphite and BAL (2,3-dimercaptopropanol). [From author's summary.]—Univ. of Kentucky, Lexington.

1345. Baker, V. H., Wiant, D. E., and Taboada, O.
Effects on electromagnetic energy on plants and animals.
Agric. Engng, St. Joseph, Mich., 1955, **36**: 808-12, bibl. 12, illus.
Studies reveal a definite relationship between radiant-energy wavelength and the degree and nature of tissue damage when electromagnetic radiation reacts with a biological material. Among topics discussed are the effects of radiation on living cells. Photomicrographs are presented which show the effects of 500 roentgens of X radiation on the chromosomes in a pollen cell of *Tradescantia reflexa*.—Va polytec. Inst.

Nutrition.

(*See also* 1374e, i, o, r, s, y, 1442-1448, 1515-1523, 1689-1695, 1750-1754, 1819.)

1346. Hudgins, H. N., and others.
Boron as a plant nutrient. A bibliography of literature published and reviewed January 1953 through December 1953.
[*Publ.*] *Amer. Potash Inst. Inc.*, 1955, 1102 Sixteenth St. N.W., Washington 6, D.C., pp. 77 + index 26.
Five preceding issues cover the literature reviewed from January 1936 to December 1941 inclusive. No issues have been published for years 1942–1952 inclusive. The information is recorded under individual crops.

1347. Reuther, W., and Smith, P. F.
Toxic effects of accumulated copper in Florida soils.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 17-23, bibl. 29.
The amounts of heavy metals, especially Cu, that may profitably be added to Florida soils are shown to be limited. Toxic amounts are already present in some acid, sandy orchard and vegetable soils. Future disease control and soil fertility research with these elements should investigate their residual effects in the soil.—Agric. Res. Serv., U.S.D.A.

1348. Brown, J. C., and Holmes, R. S.
Iron, the limiting element in a chlorosis: Part I. Availability and utilization of iron dependent upon nutrition and plant species.
Plant Physiol., 1955, **30**: 451-7, bibl. 17, illus.
Brown, J. C., Holmes, R. S., and Specht, A. W.
Idem: Part II. Copper-phosphorus induced chlorosis dependent upon plant species and varieties.
Plant Physiol., 1955, **30**: 457-62, bibl. 16.
In the first paper experiments in which soya beans, maize and spring wheat were used as test plants showed that Fe metabolism differed between plant species and varieties, and that these differences were dependent upon the medium in which the plants were growing. In the second paper studies on the effect of varying rates of Cu and P upon the absorption and translocation of Fe and the incidence of chlorosis are reported. Peach trees had been observed to show chlorosis after a green manure had been disced into the soil, followed by irrigation. Foliar analyses showed that chlorotic leaves had higher Cu, B and P contents and lower Fe, Al and Ca contents than green leaves.—U.S. Dep. Agric., Beltsville, Md.

1349. Gouny, P.
Observations sur les particularités de l'alimentation ammoniacale en l'absence et en présence de calcaire. (**Ammonium nutrition in the presence and absence of lime.**)
Ann. agron., 1955, **6**: 589-614, bibl. 25.

Mineral nutrition in the presence of lime and metabolism in relation to the source of N were studied in pea and other plants. The changes in mineral nutrition associated with the presence of lime chiefly affect the cationic fraction, the entry of which into the plant becomes difficult, ammonium being particularly affected. In an unsaturated medium NH_3-N stimulates growth when it constitutes a small fraction of the N nutrients, but it is generally injurious when it is the sole source of N. In the presence of lime the injurious effects produced on growth by an exclusively NH_3-N nutrition disappear in plants not susceptible to chlorosis. The chief factor responsible for the metabolic disturbances inherent in NH_3-N nutrition in an unsaturated medium is a deficiency of organic acids resulting from a deficiency of metallic cations.—Centre Rech. agron. Provence, Antibes.

1350. Talati, R. P.
Sewage effluent for growing crops.
Indian Fmg, 1955, **5**(8): 10-12, illus.

Information is given on the use of sewage effluent in irrigation. The sludge distributed by the Kilokri Pumping Station, Delhi, contains 1·5–2·0% N, 1% phosphoric acid and 1·5% potash. The estimated quantities of effluent supplied per acre per annum for sugar cane, vegetables and tobacco are 2,155,000, 1,089,000 and 631,000 gallons per acre respectively. The rate charged is Rs. 2 per 100 cu. ft. of sludge.

Water and irrigation.

(*See also* 1366-1368, 1374x, 1375c, 1448, 1688, 1815-1817, 2090.)

1351. Iljin, W. S.
Influencia del agua sobre la asimilación de sales del suelo por las plantas. (**The effect of water on the absorption of salts from the soil by plants.**)
Rev. Fac. Agric. Maracay,* 1955, **1**: 371-84, bibl. 41.

The subject is reviewed under the headings: evaporation and the accumulation of salts, soil moisture content and the absorption of salts, excess of water and the development of plants, and the effect of flooding on metabolism. Notes are given on the author's own investigations into the mineral contents of plants in dry and humid sites and into the effects of flooding on millet.

1352. Breazeale, E. L., and McGeorge, W. T.
Effect of salinity on the wilting percentage of soil.
Soil Sci., 1955, **80**: 443-7, bibl. 6.

A technique is described whereby the effect of salinity on the wilting percentage of soil can be determined using as little as 20 g. of soil. A 1- to 2-month-old tomato plant is used. The lower part of the stem is stripped of leaves; glass or plastic tubing is slipped over the plant to enclose a part of the bare stem; a cork stopper is fitted to the bottom of the tube, which is filled with soil, and another cork is fitted to close the top of the tube. Both corks are then sealed in place with paraffin-beeswax. Within about 10 days from the time when the roots are well developed in the tube the soil moisture will have reached the wilting percentage. In each of 4 soils with high to low wilting percentages desalinization reduced the wilting percentage and the addition of increments of salt to the desalinized soil increased the wilting percentage progressively.—Ariz. agric. Exp. Stat.

* Formerly *Rev. Fac. Ing. agron. Maracay.*

1353. Velatta, M.
Sviluppi e stato attuale della tecnica delle irrigazioni per aspersione. (**The development and present technique of sprinkler irrigation.**) [English and French summaries ½ p. each.]
Ann. Fac. Agrar. Univ. cattol. S. Cuore, 1955, **52**: 312-48, bibl. 96.

This review includes some general notes on the sprinkler irrigation of peaches, apples, vines and tobacco in Italy and of olives in Italy and Libya.

1354. Sheard, G. F.
Trickle irrigation and water requirement.
Agriculture, Lond., 1955, **62**: 413-16, bibl. 2.

Most experience in trickle irrigation has been gained with tomatoes. The author discusses soils, water supply and equipment, and also includes a guide to the amount of water required in relation to light intensity. —Fairfield Exp. Hort. Stat., Kirkham.

Glasshouses and frames.

(*See also* 1374u, 1814.)

1355. (Hoare, E. R., and Morris, L. G.)
The heating and ventilation of glasshouses.
Fm Mech., 1956, **8**: 7.

The authors discuss the factors affecting loss of heat, ventilation rates, boiler layouts and design data relating to heat emission, the distribution of piping, pump sizes and automatic controls. They recommend a change in new automatically controlled systems from the commonly used 4-in. pipes to 1- or 1½-in. pipes which facilitate temperature regulation. They also deal with pressurized hot water systems and steam injection in water systems.

1356. (Chetwynd, K. J.)
New spike grids cut down steaming costs.
Grower, 1956, **45**: 150-1, illus.

A work study showed that costs of glasshouse steaming were reduced by the following practices. Double digging preceded steaming, which was a separate operation. For steaming a comb holding 9 spikes was made, and 4 of these were set across each bed to form 1 unit. Light hoses were used of sufficient length to reduce times of re-siting, and supply control valves were placed on each unit. Sheeting of P.V.C. coating rayon replaced sacking as a steam trap. Costs per acre were reduced from £580 to £265.—Plant Protection Ltd., Fernhurst Res. Stat., Surrey.

1357. Webb, F. W.
Chemical sterilization of soil in glasshouses.
Agriculture, Lond., 1956, **62**: 526-9.

Chemical sterilization will not entirely replace the usual heat treatment of glasshouse soils, but it is a much cheaper process and, used as a partial substitute for steaming, will do much to reduce costs. The subjects discussed include available sterilizers and their uses and the cost of sterilization.

1358. Sheard, G. F.
Liquid feeding for glasshouse crops.
Agriculture, Lond., 1956, **62**: 488-91, bibl. 1.
Some advice is given on the best way to mix, dilute and inject a balanced feed into a trickle irrigation system.

1359. Kamp, J. R., and Fosler, G. M.
The new look in hotbeds and cold frames.
Amer. Veg. Gr, 1955, **3**(3): 14-15, 32, illus.
Among labour-saving and economic devices suggested are the following: the mechanization of ventilation, irrigation and removal of lath shades, and the use of plastic, sisalkraft and heavy-grade woven wire for shading or frost-protection.

Machinery and equipment.

(*See also* 1638, 1954h, 1994, 1995, 2336, 2340j.)

1360. Institute of Horticultural Engineering, Wageningen.
Horticultural implements and machines from Holland.
[*Publ.*] *Netherlands Govt econ. Inf. Serv.*, [1955], pp. 48, illus.
This catalogue, copies of which can be obtained free from the Institute at Wageningen, gives notes on the equipment available from Dutch firms and the addresses of the firms. Equipment includes glasshouses, air-conditioning installations, sprinkling equipment, plant disease control equipment, graders and transporters.

1361. The Commercial Grower.
Mechanisation in Horticulture, Autumn 1955, No. 4, pp. 28-70, illus.
This issue of the review contains articles on the following subjects: modern orchard maintenance, horticultural tractors, mobile glass, tapping irrigation water, short term storage of fruit and vegetables, mechanization in heated glasshouses and welding. [Covered by subscription to the journal or 1s. separate.]

1362. Vince, D., and others.
Studies on the effects of light quality on the growth and development of plants. I. Apparatus for the growing of plants under controlled light and temperature conditions.
J. hort. Sci., 1956, **31**: 8-15, bibl. 18, illus.
Controlled environment rooms are described in which large numbers of young plants may be grown for growth analysis and general growth studies. [From authors' summary.]—Univ. Reading, and Res. Lab., Brit. Thomson-Houston Co., Rugby.

1363. Cooke, G. W.
The performances of fertilizer distributors used in field experiments.
Emp. J. exp. Agron., 1955, **23**: 244-50, bibl. 4.
The performances of 2 commercial fertilizer distributors in spreading powdered and granular fertilizers were compared, with special reference to the use of such machines in experimental field work.—Rothamsted exp. Stat., Harpenden.

1364. Peck, N., and Vittum, M. T.
A machine for band placement of soil conditioners.
Market Grs' J., 1956, **85**(1): 22, illus.
Two nozzles were attached to a seeder unit for placement of a liquid soil conditioner over the row at planting time. The nozzle placed just behind the packer wheel was more satisfactory than that placed in front of the packer wheel. In 1952 band placement of HPAN and IBMA, at 4 and 8 oz. active ingredient per 1000 ft. row respectively, prevented crusting before seedling emergence, and was as satisfactory with carrots and beans as broadcast applications at 350 lbs. per acre. In 1954 soil conditioners applied at the same rates satisfactorily increased seedling emergence of carrots and beets.—New York agric. Exp. Stat., Geneva.

1365. Anon.
Machinery for hedge maintenance.
Fm Mech., 1956, **8**: 10-13, illus.
A survey is made of cutters and trimmers now on the market. The cutting mechanisms include reciprocating knives, single circular blades, multiple blades on a rotating disc and circular saw heads. Prices range from £30 to £383.

1366. Anon.
What's new in irrigation equipment?
Market Grs' J., 1955, **84**(12): 16, 17, 32.
Illustrations, notes and addresses of suppliers of 2 dozen items of equipment for present-day irrigation practice.

1367. de Plater, C. V.
A portable capacitance-type soil moisture meter.
Soil Sci., 1955, **80**: 391-5, bibl. 3, illus.
A portable meter is described for the rapid determination of soil moisture in terms of electrical capacitance. The meter is designed for use with a probe. [Author's summary.]—C.S.I.R.O., Canberra.

1368. Postlethwaite, J. D., and Trickett, E. S.
The measurement of soil moisture.
J. agric. Engng Res., 1956, **1**(1): 89-95, bibl. 17, illus.
Available methods of measurement are discussed. The construction is described of a simple, economical block using nylon encased in stainless steel and surrounded with a thin skin of plaster as a buffer.—Nat. Inst. agric. Engng, Silsoe, Beds.

1369. Gunkel, W. W.
Durability tests of some agricultural sprayer pumps.
Bull. Cornell agric. Exp. Stat. **915**, 1955, pp. 23, illus.
Endurance tests conducted in the laboratory on 13 different types of low-volume sprayer pumps are described. Results of field capacity tests performed on 12 different pumps are also reported. In the laboratory tests, the Ace Single and Double Diaphragm types of pump were superior to the others tested. The cast-

iron, semi-open impeller, centrifugal type of pump also had definite merit, although it is severely limited in its discharge pressures.

1370. Byass, J. B., Courshee, R. J., and Waring, N. D.
Performance of an air blast nozzle. Part I. Experimental methods and preliminary results.
Tech. Memor. nat. Inst. agric. Engng **125**, 1955, pp. 15, bibl. 8, illus.
Some guide has been obtained as to how drop size may be expected to increase with increased flow of liquid or decreased air velocity.

1371. Ingerson, H. G.
Air spraying, what is its future?
Amer. Veg. Gr, 1955, **3**(4): 13, 34-5, illus.
Some answers are given to growers' questions on spray application with air as a carrier. Equally good coverage of row crops has been obtained with air spraying and conventional high-pressure boom spraying in tests under the same conditions. Wind can help to increase swathe width; sprayers capable of treating up to 60 ft. swathes are obtainable. In row crop spraying larger air volume at medium velocity is more dependable and less affected by wind than small volume air streams at high velocity. Medium velocity is also desirable to avoid mechanical injury to plants close to the sprayer.

1372. Audus, L. J.
An efficient aerating washer for seeds or tissue discs.
Ann. Bot. Lond., 1956, **20**: 191-2, illus.
The apparatus consists essentially of an inverted conical flask into which a circulator in the form of 2 concentric cylinders is fitted. Water and air are pumped in through the outer, and escape through the inner, cylinder.—Bot. Dep., Bedford Coll., London Univ.

1373. Pirie, N. W.
A disintegrator for use with small quantities of fresh leaves.
J. agric. Engng Res., 1956, **1**(1): 81-2, bibl. 5, illus.
A unit for pressing batches of leaves up to 40 grammes in weight through a slot of adjustable width is described. The leaves can be ground to a controlled fineness. The method is suitable for work on a small scale because it is repeatable, there is no need to add fluid to the leaves and the ground material can be recovered quantitatively. [Author's abstract.]—Rothamsted exp. Stat.

Noted.

1374.

a Andreae, W. A., and Good, N. E.
The formation of indoleacetylaspartic acid in pea seedlings.
Plant Physiol., 1955, **30**: 380-2, bibl. 5.

b Audus, L. J.
Growth substances and plant development.
Endeavour, 1955, **14**: 205-11, bibl. 21, illus.

c Bertrand, G., and Silberstein, L.
Teneur en manganèse d'environ cinq cents échantillons de phanérogames. **(Manganese content of some 500 phanerogams.)**
Ann. agron., 1955, **6**: 523-35, bibl. 5.
Including numerous dicotyledonous and monocotyledonous families.

d Betz, A.
Zur Atmung wachsender Wurzelspitzen. **(Respiration of developing root tips.)**
Planta, 1955, **46**: 381-402, bibl. 37.
Of peas.

e Bewley, W. F.
Feeding crops through their leaves.
Gdnrs' Chron., 1955, **138**: 230, bibl. 2.

f Blanc-Aicard, D.
Études préliminaires sur l'absorption radiculaire des cations. **(Preliminary studies on root absorption of cations.)**
Ann. agron., 1955, **6**: 615-33, bibl. 15.

g Breves, J.
Ein neues Etikett—ein neuer Schritt zur Rationalisierung. **(A new label—a further step forward.)**
Dtsch. Baumsch., 1955, **7**: 298-9.
The "Meyer" label of a strong, light, non-inflammable material.

h Fawcett, C. H., and others.
Alpha-oxidation of omega-(2:4-dichlorophenoxy)-alkanenitriles and 3-indolylacetonitrile within plant tissues.
Nature, 1955, **176**: 1026-8, bibl. 7.
Work at Wye College.

i Gautheret, R. J.
The nutrition of plant tissue cultures.
Annu. Rev. Plant Physiol., 1955, **6**: 433-84, bibl. 306.

j Gibbs, M., and Beevers, H.
Glucose dissimilation in the higher plant. Effect of age of tissue.
Plant Physiol., 1955, **30**: 343-7, bibl. 18.
Test plants included castor bean, tomato, *Coleus* and pea.

k Goulden, C. H.
Agricultural progress in Canada—I and II.
World Crops, 1955, **7**: 427-30, 493-6, illus.
Including vegetables, fruit and tobacco.

l Greenidge, K. N. H.
Observations on the movement of moisture in large woody stems.
Canad. J. Bot., 1955, **33**: 202-21, bibl. 7, illus.
Species included *Acer saccharum* and *Prunus pennsylvanica*.

m Koller, D.
The regulation of germination in seeds.
Bull. Res. Coun. Israel, 1955, **5D**: 85-108, bibl. 203.
A review.

n LUNDEGÅRDH, H.
Mechanisms of absorption, transport, accumulation, and secretion of ions.
Annu. Rev. Plant Physiol., 1955, **6**: 1-24, bibl. 75.
A review.

o MICHIGAN STATE COLLEGE, DEPARTMENT OF HORTICULTURE.
Starter solutions. The use of concentrated fertilizers on vegetables, flowers, fruits and ornamentals.
Ext. Folder Mich. St. Coll. **F-194**, 1955, 1 folded sheet.

p MUIR, R. M., AND HANSCH, C.
Chemical constitution as related to growth regulator action.
Annu. Rev. Plant Physiol., 1955, **6**: 157-76, bibl. 74.
A review.

q NUERNBERGK, E. L.
Zur Technik der vergleichenden Messung der Photosynthese mittels des URAS und ihre Anwendung auf die Untersuchung periodischer Photosynthese-Kurven. **(A technique for comparative measurement of photosynthesis by means of URAS and its application to the study of periodic photosynthesis curves.)**
Gartenbauwiss., 1955, **2**: 58-91, bibl. 41, illus.
Using records of infra-red absorption.

r PIRSON, A.
Functional aspects in mineral nutrition of green plants.
Annu. Rev. Plant Physiol., 1955, **6**: 71-114, bibl. 310.

s SCHARRER, K., KÜHN, H., AND LÜTTMER, J.
Die Borbestimmung mit Chinalizarin in Pflanzen, Böden und Düngemitteln. **(Estimation of boron in plants, soils and fertilizers by quinalizarin.)** [English summary ¼ p.]
Landw. Forschung, 1955, **8**: 26-32, bibl. 6.

t SHEWELL-COOPER, W. E.
Visit to Corsica.
Agriculture, Lond., 1955, **62**: 429-32, illus.
Impressions of horticulture.

u SMITH, F. G.
Mobile glasshouses.
Agriculture, Lond., 1956, **62**: 522-5.

v SNOW, R.
Problems of phyllotaxis and leaf determination.
Endeavour, 1955, **14**: 190-9, bibl. 28, illus.
Current theories.

w SPORNE, K. R.
The phylogenetic classification of the angiosperms.
Biol. Rev., 1956, **31**: 1-29, bibl. 117, illus.

x STANHILL, G., AND WINTER, E. J.
An instrument for measuring soil-moisture deficit.
Nature, 1955, **176**: 1276, bibl. 2.
A combined rain-gauge and evaporimeter.

y STRZEMIEŃSKI, K.
Total and radioactive phosphorus determination in small plant samples using the gravimetric method of Lorenz.
N.Z. J. Sci. Tech., Sect. B, 1955, **37**: 243-54, bibl. 13.

z TODOROVIĆ, D.
Analytical presentation of growth. [Yugoslav, with German summary 31 pp.]
Annuaire Fac. Agric. Sylvic., Skopje, 1953/54, 1955, **7**: 15-225, bibl. 27.
Analytical presentation of the combination of growth elements in trees and crops.

1375.

a VIRGIN, H. I.
A new method for the determination of the turgor of plant tissues.
Physiol. Plant., 1955, **8**: 954-62, bibl. 8.
Based on oscillations of a vibrating body.

b VISHNIAC, W.
Biochemical aspects of photosynthesis.
Annu. Rev. Plant Physiol., 1955, **6**: 115-34, bibl. 114.

c WALTER, H.
The water economy and the hydrature of plants.
Annu. Rev. Plant Physiol., 1955, **6**: 239-52, bibl. 50.

d WEBSTER, G. C.
Incorporation of radioactive amino acids into the proteins of plant tissue homogenates.
Plant Physiol., 1955, **30**: 351-5, bibl. 16.
In pea seedlings.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 1296, 1468d, g, k, 1679, 1703, 1837j, 2308.)

1376. COMMONWEALTH ECONOMIC COMMITTEE.
Fruit. A review of production and trade relating to fresh, canned and dried fruit, fruit juices and wine.
[*Publ.*] *Commonw. Econ. Cttee*, 1955, pp. 170, 5s.
This review, issued annually, contains tables and summaries of acreages, production and consumption in individual countries and of international trade during the last pre-war years and recent years up to 1954 for the following: apples, pears, plums, cherries, peaches, apricots, grapes, pineapples, oranges, grapefruit, lemons, bananas, canned fruit, fruit juices, raisins and currants, dried tree fruits and wine. Four appendices give information on supplies and utilization of fruit in the United Kingdom, Australia, Canada and the United States; on government measures affecting the

import of fruit into the United Kingdom; on assistance for West Indian banana and citrus industries; and on import duties and trade regulations in the United Kingdom, Canada, Ireland and a number of European countries.

1377. Royal Horticultural Society.
The Fruit Year Book 1956, No. 9.
R.H.S., Vincent Square, London, 1955, 9 × 5½ in., pp. 132, illus., 10s. 9d. post free.

In this ninth edition of the Fruit Year Book 13 articles covering a wide range of subjects in fruit growing have been included. Apple history has received particular attention, as is shown by articles on the Sir Isaac Newton apple, on Blenheim Orange, and on Francis Bacon's observations on fruit storage. In contrast, some recent fruit literature is reviewed by Miss P. Rowe-Dutton. In other articles, commercial growing methods in Canada and the West Midlands are described, while amateurs will find much of interest in descriptions of fruit growing in a small garden plot and grape growing in a small greenhouse. Pruning of bush apples and of fan-trained peach trees is described in contributions from East Malling Research Station. In addition there are interesting reports on two meetings of the Fruit Group, one of which was a Brains Trust and the other a discussion on the training of raspberries and apples. An exhibit demonstrating the classification of apples, which was staged at the Fruit Show in 1954, is described with a list of varieties shown.

1378. Souty, J., and others.
Station de Recherches Viticoles et d'Arboriculture Fruitière du Sud-Ouest, Pont de la Maye (Gironde). Travaux effectués pendant la période 1938–1953 par la section d'arboriculture. **(Viticultural and fruit tree research station of the south-west, Pont de la Maye (Gironde). Research conducted in the years 1938–53 by the fruit tree section.)**
Ann. Amél. Plantes, 1955, **5**: 121-236, illus.

Research concerned varieties, rootstocks and biology. Varietal research covered the variety collections of stone fruits and apple, particular varieties of peach, plum and apricot, new varieties and varietal selection. Rootstock research covered seedling peaches and apricots, peach × almond and other interspecific hybrids, quick- and slow-growing plums and the Sainte-Lucie cherry. Biological research covered floral biology, interspecific hybrids, seed germination, mineral deficiency studies, peach pruning and graft-transmissible diseases.

1379. Wilhelminadorp.
Jaarverslag 1954, Proefstation voor de Fruitteelt in de Volle Grond, Wilhelminadorp (bij Goes). **(Annual Report 1954 of the Experiment Station for Fruit-growing in the Open, Wilhelminadorp (near Goes))**, 1955, pp. 78, illus. [English summaries.]

In June 1954 the work of the Experiment Station at Wilhelminadorp, which had been a demonstration plot and research centre for fruit growers in Zeeland, was expanded to cover outdoor fruit-growing for the whole of the Netherlands. The Station works in close co-operation with the Institutes at Wageningen and with the Advisory Service. [See also separate abstracts.]

1380. Rumbeke-Beitem(Westvlaamse Proeftuin).
Verslag Westvlaamse Proeftuin, Rumbeke-Beitem, 1953. **(Report of the West Flanders Experimental Garden, Rumbeke-Beitem, Belgium, for 1953)**, pp. 32, illus.

Brief notes with some tables are given on the following experiments. Manurial trials with apples and pears. Effect of a windbreak and straw mulch on pear. The effect of growth substance sprays on colour, firmness, yield and storage quality of apples. Apple and plum rootstock studies. Effect of pruning on apple yields. Apple and currant variety trials.

1381. Rumbeke-Beitem(Westvlaamse Proeftuin).
Verslag Westvlaamse Proeftuin, Rumbeke-Beitem, 1954. **(Report of the West Flanders Experimental Garden, Rumbeke-Beitem, Belgium, for 1954)**, pp. 28, illus.

Some results from the following experiments are briefly reported: effect of windbreaks and straw mulch on pear yields; cover crops for pears; ringing of pears; yields of apples and plums as influenced by rootstock; training apple trees; varietal trials of commercial apples.

1382. Comité National pour l'Étude de la Culture Fruitière, Belgique.
Rapport Succinct, Comité National pour l'Étude de la Culture Fruitière, Déc. 1954–Dec. 1955. **(Short Report, [Belgian] National Committee for the Study of Fruit Growing, December 1954–December 1955)**, pp. 69.

This report contains brief summaries of the investigations conducted. *Cover crop research:* the value and management of cover crops in orchards. *Fertilizer research:* field studies on methods of application, pot experiments on various NPK formulas, diffusion of P fertilizers in the soil studied by isotopes. *Varietal research:* soil/stock/scion relationships, cytological studies (pollen, chromosome counts, embryo culture and colchicine treatment). *Cultural research:* chemical thinning of apples.

1383. Schad, C., and others.
Recherches d'arboriculture fruitière de la Station d'Amélioration des Plantes de Clermont Ferrand. 1. Études sur le pommier. Compte rendu des travaux effectués de 1940 à 1953. **(Research on fruit tree growing at the Station d'Amélioration des Plantes at Clermont Ferrand. I. Studies on the apple tree. Report on research conducted between 1940 and 1953.)**
Ann. Amél. Plantes, 1955, **5**: 247-70, bibl. 1, illus.

Research was conducted on fertility, varietal characters and decline due to fungal root rot. Fertility studies (Bidabe, B.) covered the technique of controlled pollination, the period of stigma receptivity, self-fertility, intercompatibility and varietal mixtures. Varietal studies (Bidabe, B. and Arnaud, R.) concerned the characters of varieties recommended by the Conseil Supérieur d'Agriculture, the characters of flowers, fruit, leaves and ripened one-year-old shoots and varietal nomenclature. Research on decline (Grente, J.) covered symptoms and causes, environmental effects, control and selection of resistant varieties.

1384. California Fig Institute.
Proceedings of the Annual Research Conferences of the California Fig Institute, 1952, 1953, 1954 **and** *1955*, pp. 45, 44, 52 and 46, respectively.
These 4 Proceedings have lately been received through the courtesy of the Research Director of the Institute. Separate abstracts of papers in the 2 latter appear in this and the Plant Protection section.

1385. Warner, R. M.
Progress in fig research.
Proc. 8th annu. Res. Conf. Calif. Fig Inst., 1954, pp. 3-4.
Fig research in California has resulted in promising new varieties, cheaper manuring and control to a greater or lesser degree of endosepsis disease, fig scale, the dried-fruit beetle and nematodes.

1386. Fjäderhane, A. M., and Hansen, B.
Arbetsförbrukningen i fruktodlingen år 1954. **(Labour requirements in fruit growing in 1954.)** [English summary 1 p.]
Medd. Alnarpsinst. Trädgårdsavd. trädgårdsekon. Bryån **20**, 1955[?], pp. 36.
Time studies were made on the work of men, women, tractors and cars on 16 fruit farms in the province of Småland, Sweden. About $\frac{1}{3}$ of the men's time was needed for maintenance and $\frac{1}{3}$ for harvesting. Harvesting took up 85% of the women's time. Maintenance and cultivation occupied $\frac{2}{3}$ of the tractor work.

1387. Kenney, J. E.
The economics of fruit-growing in New York State.
Diss. Abstr., 1955, **15**: 1521, being *Publ.* 12702 of 303 pp.
Apples are the most important fruit crop grown in New York State, followed by cherries and grapes. There has been an overall decline in amount of fruit grown except as regards cherries. Fruit prices are determined by size of crops and buying power of the customer.—Syracuse Univ.

1388. Ruck, H. C.
A major problem of deciduous fruit growing in Cyprus.
Countryman, Nicosia, December 1955, pp. 6-7, bibl. 2, illus.
The problem in question is that of finding cultural techniques and varieties suitable for the plains of Cyprus. The names are given of warm-winter-tolerant varieties of apples, pears, plums, peaches, apricots and cherries which might prove suitable.

1389. Williamson, J.
Observaciones sobre árboles y arbustos de hojas caducas cultivados en la provincia Eva Perón. **(Notes on deciduous trees and shrubs introduced into the Eva Perón province.)**
Rev. argent. Agron. B. Aires, 1955, **22**: 17-39, 95-101 and 141-56.
Chiefly owing to the low rainfall and low R.H. the eastern part of Eva Perón province consists, except for a few isolated islands of woodland, of a naturally treeless plain. An annotated list is given of fruit, ornamental and other trees and shrubs which have been successfully introduced.

1390. Uehara, M.
Studies of the micrometeorology of sloping orchards. 1. [Japanese, with English summary $\frac{3}{4}$ p.]
J. hort. Ass. Japan, 1955, **24**: 103-16, bibl. 7.
The results are given of a study on the amount of insolation on slopes of different aspects and degrees.

1391. Lamb, J. G. D.
A record of fifty years of apple growing under the Department of Agriculture.
J. Dep. Agric. Dublin, 1953–54, **50**: 30-43.
With the foundation of the Department of Agriculture for Ireland in 1900 efforts were made to stimulate commercial fruit-growing. Shows were held, county instructors were appointed and fruit plots were planted under assistance schemes. Official planting schemes were renewed in 1934, but in 1941 they were limited to dessert apple plantations. Cider apple production has also been encouraged. A country-wide census showed that small orchard plots were scattered over the country, while the few areas of greater concentration were largely those with a tradition of fruitgrowing. Recently, with Government help, a co-operative fruitgrowing society has been set up.

1392. Prest, R. L.
The fig.
Qd agric. J., 1955, **81**: 137-43, illus.
Figs are grown on a small scale in Queensland mainly in the Metropolitan area. The bulk of the fruit is used for jam as the fresh fruit deteriorates rapidly. The varieties grown belong to the Common group, Brown Turkey being the main commercial variety. Cultural details are given.

Varieties.

(*See also* 1468f.)

1393. Brooks, R. M.
1955's new fruit varieties.
Amer. Fruit Gr, 1956, **76**(1): 44-6, 49-50, illus.
In the current *Register of New Fruit and Nut Varieties* there are brief descriptions of 1 almond, 5 apple, 1 avocado, 1 cherry, 8 nectarine, 8 peach, 2 pear, 4 pecan, 1 plum, 2 raspberry, 4 strawberry and 1 walnut varieties.

1394. Brown, A. G.
Bud sports.
Fruit Year Book 1956, pp. 38-9, illus.
The various types of bud sports occurring in fruits are discussed. Recently much attention has been paid to large fruited sports which are diploid-tetraploid chimaeras.—John Innes hort. Instn, Bayfordbury, Hertford.

1395. Dermen, H.
Three additional endogenous tetraploids from giant apple sports.
Amer. J. Bot., 1955, **42**: 837-42, bibl. 5, illus.
Totally tetraploid shoots were obtained from 2-4-4 type chimeral plants of 3 apple varieties: var. Delicious,

Ontario, and Wrixparent. These tetraploid shoots were obtained adventitiously and endogenously by a disbudding method developed by the author. Samples were examined to study branch trace relationship between these shoots and mother stems. Evidence is presented to show that there were no leaf or branch traces extending from the bases of endogenously developed shoots or buds into the pith of the mother stems. [Author's summary.]—U.S.D.A., Beltsville, Md.

1396. Dermen, H.
A homogeneous tetraploid shoot from a 2-2-4 type chimeral Winesap apple.
J. Hered., 1955, **46**: 244, bibl. 3.
A complete tetraploid of Winesap has been obtained by disbudding one-year-old trees, propagated from a 2-2-4 cytochimeral tree.—Agric. Res. Serv. USDA, Beltsville, Md.

1397. Robb-Smith, A. H. T.
Blenheim Orange variants, false Blenheims and Blenheim seedlings.
Fruit Year Book 1956, pp. 12-34, illus.
The author, after a study of many samples, concludes that differences in fruit and leaf characters, flavour and keeping qualities were too wide to be due to environment alone. The variants are probably somatic variations of the original Blenheim. It is suggested that one reason for the decline in popularity of Blenheim is that most of those grown at present are the Broad-eyed variety which does not compare in eating or keeping quality with the classical Blenheim.

1398. Meier, G.
Anbauerfahrung mit der Apfelneuzüchtung Erwin Baur. **(Cultural experience with the new apple variety Erwin Baur.)**
Dtsch. Gartenb., 1956, **3**: 11-12, illus.
Ten years' observations on trees of Erwin Baur on M.IX have shown that it produces high yields of good quality fruit and is relatively resistant to frost, scab and mildew.—Inst. Obst-u. Gemüseb., Univ. Halle. [See also *H.A.*, 26: 138.]

1399. Brierley, W. G.
The Perkins seedling apples.
Minn. Hort., 1955, **83**: 124-5.
Perkins seedling apples were a group of apples raised at the end of the nineteenth century in Minnesota. The fruits of the Perkins variety itself kept all winter, had a good shape and were well coloured. Damage to the trees, however, often occurred during severe winters. The varieties have now almost disappeared from cultivation.

1400. Dommergues, P., Fleckinger, J., and Messié, R.
Sur une méthode de description des variétés de pommiers à cidre. **(On a method of describing cider apple varieties.)**
Ann. Amél. Plantes, 1955, **5**: 335-443, bibl. 48, illus.
The Station Centrale de Génétique et d'Amélioration des Plantes, Versailles, has undertaken a description of the cider apple varieties of France. The characters used number 157 and concern flower, fruit, leaf, shoot and habit.

1401. Tixier, P.
Une pomoidée indochinoise: le pommier de Dalat, *Pirus doumeri* (Bois). **(*Pyrus doumeri*, an Indo-Chinese pome fruit tree.)**
Fruits d'Outre Mer, 1955, **10**: 518-19, illus.
A description is given of this large deciduous tree of the hill forests of Indo-China. Its fruit somewhat resembles that of the wild apple.

1402. Pirovano, A.
Due nuove pere estive: Mora (I.P.112) e Itala (I.P.999). **(Two new early pears: Mora (I.P.112) and Itala (I.P.999).)**
Riv. Fruttic., 1956, **18**: 19-24, bibl. 1, illus.
A Beurré Clairgeau × Williams hybrid ripening in late July or early August and a pollen-irradiated Beurré Clairgeau × Martin secco hybrid ripening in late August or early September.

1403. Bain, H. D.
Dessert peaches and apricots—varieties, picking and packing.
J. Agric. S. Aust., 1955, **59**: 192-7, illus.
Information is given on 20 dessert peach varieties with a season ranging from late November (Mayflower) to mid-March (Salway Improved) and 4 dessert apricots with a season ranging from mid-November to early January. Other subjects covered are stage of maturity for picking, picking, grading and sizing, containers, packing and cool storage.

1404. Hintze, S.
Sort- och grundstamförsök med plommon vid Rånna 1939–1954. **(Variety and rootstock trials with plums at Rånna [Sweden] 1939–1954.)** [English and Esperanto summaries ½ p. each.]
Medd. Trädgårdsförs. Malmö **92**, 1955, pp. 7, bibl. 2.
A trial of 4 plum varieties and 6 rootstocks was planted in the period 1939–41 at Rånna. Growth was measured in the autumn of 1954. Reine Claude d'Oullins had formed the biggest trees, Czar the smallest. On Myrobalan B all varieties formed large trees. On *Prunus mariana* trees were smaller, and yields were lower than on the other stocks. Yields from Victoria were highest during the first years, but total yields during the experiment were highest from Reine Claude d'Oullins. The lowest total yield was from Czar. On Myrobalan B total yields were slightly better than on the other stocks, from which yields were about equal. Rootstock had no apparent effect on fruit size.

1405. Slovitsc, D.
Supplementary information on Ohrid cherries. [Yugoslav, with English summary 1¼ pp.]
Annuaire Fac. Agric. Sylvic., Skopje, 1951/52, 1954, **5**: 45-85, bibl. 5, illus.
The shores of Lake Ohrid are the most important cherry-growing regions of Yugoslavia. The varieties most widely grown are Dalbaslija which has a soft, red-skinned fruit, with good growth and heavy yields, and

Ohrid black cherry, which has a firm flesh and ripens after Dalbaslija. *Prunus avium* is used as a rootstock.

1406. Condit, I. J.
California fig varieties: history and identity.
Proc. 8th annu. Res. Conf. Calif. Fig Inst., 1954, pp. 4-8.
Notes are given on varieties of the Caprifig, the Smyrna, the San Pedro and the Common types. The most important commercial variety in California is the Kadota which is identical with the Dottato of Italy. [See also *H.A.*, 25: 3523.]

1407. Bianchedi, A.
Dal seme giapponese originario alle nuove varietà di gelso Kokusò. **(The new Kokusò varieties of Japanese mulberry.)**
G. Agric. Domen., 1955, from abstr. in *Riv. Ortoflorofruttic. ital.*, 1955, **39**: 582.
The Kokusò varieties 20, 21 and 27 yielded a greater quantity of leaves of a higher nutritive value than the Italian variety Morettiano, and produced their leaves about a week earlier.

Propagation and rootstocks.

(*See also* 1404, 2340f.)

1408. Sweet, D. V., and Carlson, R. F.
Rooting of cuttings in air-cooled mist-chamber.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **38**: 258-67, bibl. 17, illus.
In a polyethylene-enclosed mist-chamber rooting of summer cuttings of some difficult species was more satisfactory with, than without, air circulation. The leaf area of the cuttings was held at 83° F. Rooting was accelerated and more roots were formed on Mahaleb cherry cuttings in the air-cooled mist-chamber. Leafy apple cuttings of M.VII rooted after 6 weeks in the air-cooled chamber. All chrysanthemum and carnation cuttings rooted within 8 and 21 days respectively. Survival of transplanted cuttings, when removed from the mist immediately after rooting, was estimated at 90–100%.

1409. Schöll, W.
Ein Bewurzelungsversuch bei Quitten. **(Rooting experiments with quince.)**
Dtsch. Baumsch., 1956, **8**: 26.
A report is given of results obtained by P. Nicolin at the Staatliche Obstbauschule, Nürtingen, with rooting of quince cuttings. Cuttings treated with a root-promoting growth substance before heeling in gave 15% rooting. Untreated cuttings heeled into normal soil gave 22% rooting, while those in sawdust gave 90% rooting.

1410. Nicolin, P.
Erfolgreiche Steckholzvermehrung bei Quitte A. **(Successful propagation of Quince A by cuttings.)**
Dtsch. Baumsch., 1955, **7**: 299-301.
Cuttings were taken in late autumn or early winter, bundled in lots of 20–30, and kept moist in sawdust in a frost-free cellar. By March all had callused and some had produced small roots.

1411. Scaramuzzi, F.
Alcuni aspetti della disaffinità nel sovrinnesto degli alberi da frutto. **(Some aspects of incompatibility in the double working of fruit trees.)** [English summary 9 lines.]
Riv. Ortoflorofruttic. ital., 1955, **39**: 523-33, bibl. 21, illus.
The author briefly reviews 3 different types of incompatibility, namely, those which can and cannot be overcome by double working and that due to double working.

1412. Schmadlak, J.
Betrachtungen zur Entwicklung von neuen Veredlungsverfahren in der Obstbaumschule. **(Considerations on the development of new propagation methods in the fruit tree nursery.)**
Dtsch. Gartenb., 1956, **3**: 3-6, bibl. 8, illus.
The apple varieties Early Victoria and Wilhelmapfel were double-shield budded by the Nicolin method with M.XI and IV on to M.XI. Differences in vegetative growth as measured by shoot length were apparent in the nursery between the different combinations. The flower numbers produced by Early Victoria varied with the rootstock combination. Scions on M.IV intermediate often showed delayed flowering and a longer flowering period.—Inst. Obstb. Obstz., Magdeburg-Ottersleben.

1413. Avent, K. L.
Apple rootstocks.
J. Agric. Vict., 1955, **53**: 443-5, illus.
Notes on Northern Spy, Malling series, Merton series, S.4., and Malling–Merton stocks tested at Scoresby and Tatura and in small district trials in Victoria.

1414. Sadamori, S., and Murakami, H.
Studies on rootstocks of apple. II. Comparison of domestic apple and *Malus sieboldii* seedlings under nursery and orchard conditions. [Japanese, with English summary 7 lines.]
J. hort. Ass. Japan, 1955, **24**: 117-21, bibl. 17.
Trials begun in 1949 show that apple seedlings are not inferior as rootstocks to *Malus sieboldii*, a common Japanese rootstock, and that seedling stocks give uniform growth, whereas *Malus sieboldii* sometimes causes dwarfing. [See also *H.A.*, 23: 2560.]

1415. Reichel, M.
Erfahrungen mit Malus VII. **(Experience with M.VII.)**
Dtsch. Gartenb., 1956, **3**: 12-14, bibl. 7, illus.
Experience with several apple varieties on M.VII has shown that in central Germany growth and yield on M.VII is generally less than that on M.II. M.VII is probably a rootstock suitable for very loamy soils. Root anchorage is better than in M.IV.—Inst. Obst-u. Gemüseb., Univ. Halle.

1416. Ruck, H. C., and Bolas, B. D.
Studies in the comparative physiology of apple rootstocks. I. The effect of nitrogen on the growth and assimilation of Malling apple rootstocks.
Ann. Bot. Lond., 1956, **20**: 57-68, bibl. 13.
The growth and net assimilation rates of 4 Malling apple rootstocks of varying vigour were observed under a wide range of cultural conditions, viz. soil, sand, and nutrient solution at 3 different hydrogen ion concentrations. The mean net assimilation rates of the

stocks were found to be in order of vigour, irrespective of cultural medium, greater vigour always accompanying higher assimilation rates. There was a marked differential response to nitrogen, Crab C, a vigorous stock, being more efficient than M.IX at low nitrogen supply, whereas at higher levels the relative differences were less pronounced. Nitrogen deficiency also reduced very markedly the net assimilation rate of both stocks. [Authors' abstract.]—Imp. Coll. Sci. Tech., London, and E. Malling Res. Stat.

1417. Nelson, S. H., and Tukey, H. B.
Effects of controlled root temperatures on the growth of East Malling rootstocks in water culture.
J. hort. Sci., 1956, **31**: 55-63, bibl. 29, illus.
Root temperature affects the performance of East Malling apple rootstocks.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **38**: 46-51, illus.

In studies on the effect of root temperature on growth of rootstock varieties, 5 East Malling clones and 1 rootstock of seedling origin were grown in nutrient solutions at 44°, 55°, 66°, and 77° F., but at the same air temperature. The onset of new growth in shoot and root was accelerated by a rise in temperature from 44° to 77° F. Definite differences in root production were evident. All rootstocks showed very slight root growth at 44° F.; root growth in M.VII, M.XVI and seedling rootstocks increased as the temperature was raised from 44° to 77° F., while greatest root growth in M.I, M.II and M.IX was at 55° F. All of the last two rootstocks were killed at temperatures above 55° F. The cortex of those plants that grew better at low temperatures was severely browned, ruptured and often sloughed at high temperatures. This condition was not so marked in varieties tolerant of high temperatures. At 44° F., the roots were thick, pearly white and non-branched, while at 77° F. they were slender, much branched, and more or less discoloured. Shoot growth was proportional to root growth. Shoots of M.I, M.II and M.IX were longest at 55° F.; M.XVI was almost equally tolerant of 55°, 66° and 77° F., but growth was slightly greater as the temperature increased. The most extensive top growth was at 66° F. for M.VII and at 77° F. for seedlings. Raising the root temperature from 44° to 77° F increased root cell maturation, as illustrated by differentiation of primary tissues, vascular cambial activity and subsequent deposition of secondary tissues. The highest root temperature also increased browning and sloughing of the cortex. Several of the East Malling rootstocks tested appear to prefer a relatively cool root temperature. It is suggested that this factor be further explored on the North American continent, where soil temperatures over large areas are relatively high for extended periods. [From authors' summary.]—Michigan St. Univ., East Lansing.

1418. Friedrich, G.
Der Einfluss der Zwischenveredlung auf Unterlage und Reis unter besonderer Berücksichtigung der Standfestigkeit der Bäume. **(The effect of the intermediate stock on rootstock and scion with particular reference to tree stability.)**
Dtsch. Gartenb., 1956, **3**: 6-8, illus.

The effect of intermediate scions on tree vigour has been observed in several apple varieties. In trees of James Grieve, Oldenburg, Goldpärmane and Ontario on M.XI, with Virginia Crab or Transcedent Crab as stem-builders, marked differences in growth were apparent and all stages between dwarf and full-grown trees were observed. Cox, Boskoop and Ontario on seedling rootstock with M.IX as an intermediate also showed differences in crown development. It is suggested that, with the help of a weak intermediate scion, it may be possible to grow trees with small crowns but vigorous root systems.—Inst. Obst-u. Gemüseb., Univ. Halle.

1419. Mosse, B., and Scaramuzzi, F.
Observations on the nature and development of structural defects in the unions between pear and quince.
J. hort. Sci., 1956, **31**: 47-54, bibl. 7, illus.

Observations were made on the union structure of 15-year-old and 3-year-old Williams' on quince rootstocks. The older trees were double grafted, and the younger trees were single budded or double-shield budded. All pear/quince unions, irrespective of the horticultural compatibility of the intermediate used, showed a well-marked, dark brown separation layer between the outer bark of pear and quince. All pear/quince unions showed some microscopic evidence of uncongeniality in the form of abnormal proliferation of the phloem rays, and of necrotic cells occurring singly or in groups in the bark or very close to the union. The largest amount of necrotic tissue occurred in the 2-year and older phloem, and the damage appeared to originate in the older parts of the 1-year-old phloem and to spread in the rays. The extent of the microscopic abnormalities and of the spread of the separation layer into the inner phloem and up to the cambium appeared to be related to the degree of horticultural compatibility of the pear variety used as intermediate. It is suggested that breaks in the continuity of the woody tissues arise when lethal substances, which accumulate in the older phloem near the union, are able to reach the cambium. [From authors' summary.]—E. Malling Res. Stat., Kent, and Inst. Colt. Arbor., Florence.

1420. Brossier, J.
Recherches d'arboriculture fruitière à la Station de Recherches Viticoles, Oenologiques et d'Arboriculture Fruitière d'Angers. Compte rendu des travaux poursuivis de 1949 à 1953. **(Research on fruit growing at the Station de Recherches Viticoles, Oenologiques et d'Arboriculture Fruitière d'Angers. Report on research conducted between 1949 and 1953.)**
Ann. Amél. Plantes, 1955, **5**: 325-33.

Studies were made on quince and on the possible value of 6 *Pyrus* spp. as pear rootstocks. Collections of dessert varieties of apples and pears are being made.

1421. Farmer, A.
Comparison of four rootstocks for Sultan plum in the Auckland district.
N.Z. J. Sci. Tech., Sect. A, 1955, **37**: 318-22, bibl. 4.

An account is given of the vigour, size, and cropping

after 7 years' growth of Sultan plum on Buck, Marianna, and Myrobalan B stocks and on peach seedlings. The largest trees were on Buck. Medium-sized trees were produced by Marianna and Myrobalan B. Peach gave smaller trees of variable size. In the first 4 years of cropping, total production on Buck and Marianna was almost equal, and was significantly greater than on peach and Myrobalan B. Under the experimental conditions, Marianna appeared to be a more promising stock for Japanese-type plums than Myrobalan. [From author's summary].—Fruit Res. Stat., D.S.I.R., Auckland.

Pollination.

(*See also* 1468b, 1, 1626, 1627.)

1422. Visser, T.
Germination and storage of pollen.
Meded. LandbHoogesch. Wageningen, 1955, **55**: 1-68, bibl. 145, illus.

Storage and germination requirements of pollen, with special reference to apple and pear, have been studied. The supply of sugar and/or boron solutions to cut pear branches significantly improved the germination of the pollen in sugar solution with B. The best germination was obtained with pollen from cut branches receiving 4% sugar and 5 or 10 p.p.m. boric acid. Germination in sugar solution without B was poor. The germination of pollen from attached pear branches in sugar solution without B increased proportionally with the amount of B supplied to the branches. In sugar solution with B germination was independent of the B levels supplied to the branches. Most of the pollen tested was more sensitive to B when germinated in water than in 10% sugar solution. The effect of B sprays on fruit set was not significant. The amount of B present in the germinating medium determined the percentage germination and the length of pollen tubes with apple and pear pollen. Boric acid was found to be necessary from the moment of tube protusion. The degree of B sensitivity increased with age of pollen, but decreased after the pollen had been kept under relatively moist conditions for a short time before germination. The percentage germination was linearly related to the rate of germination, whether boric acid was present in the medium or not. The rate of germination was higher when boric acid was present. Bursting appeared to be an alternative to germination and occurred when tube growth was impeded. The relationships between germination and temperature on the one hand and between germination and sugar concentration on the other may be represented by optimum curves. The relative influence of boric acid on rate of germination was positively correlated with temperature and negatively correlated with sugar concentration. Germination was positively correlated with the number of grains per drop of medium, irrespective of the presence of boric acid, but mutual stimulation was more marked when boric acid was present in the medium or when pollen originated from branches with a relatively high B level. Pollen extracts in 10% sugar solution with and without boric acid stimulated germination. It is postulated that both the stimulating effect of boric acid and the mutual stimulation of pollen grains on germination are due to a complex of boric acid and an unknown substance having germination-promoting properties. Apple, pear, azalea, rhododendron and tomato pollen was stored under different conditions of humidity, temperature and air pressure. Viability was almost unimpaired at −20° and −190° C. after 2–3 years. At 2–4° C. only apple and pear pollen remained fairly viable at 10% r.h. or at reduced air pressure during 2 years. After pre-drying, pollen longevity was generally increased at low humidity and temperatures below zero.—Lab. Tuinbouwpl., Wageningen.

1423. Visser, T.
Problemen bij stuifmeel van fruitgewassen. **(Handling pollen of deciduous fruits.)** [English summary ⅓ p.]
Meded. Dir. Tuinb., 1955, **18**: 856-65, bibl. 26, illus.

Pollen removal by combing the anthers from the flowers just before dehiscence can be recommended for use on a small scale. The collection of pollen pellets stripped from bees by a "pollen trap" appears to be a promising and effective method for large-scale artificial pollination. Lycopodium spores have proved to be a satisfactory carrier for pollen. Of the methods tested so far, hand pollination with a brush has given reliable results. Little or no thinning is subsequently required, but where there is danger of frost or hailstorms, hand pollination may considerably increase the risk of unsatisfactory yields. The main factors affecting germination are mentioned [for a fuller account see previous abstract].

1424. Dikshit, N. N.
Effect of hormones on germination in loquat pollen.
Curr. Sci., 1956, **25**: 27-8, bibl. 1.

The effect of hormones on germination and growth of pollen was studied with *Eriobotrya japonica*. At 5 p.p.m. NAA gave the best germination percentage, and pollen germinated in 68 minutes. Increasing concentrations of β-IAA reduced growth in length of the pollen tube.—Co-ordinated Scheme for Res. on Micronutrients, Gonikopal, S. Coorg.

1425. Visser, T.
Bloembiologische aspecten bij appel en peer. **(Aspects of the floral biology of apple and pear.)** [English summary ½ p.]
Meded. Dir. Tuinb., 1955, **18**: 933-44, bibl. 24, illus.

The petals were found to be chiefly responsible for insect attraction, the stamens having a much smaller effect. In emasculation studies removal of only petals and stamens resulted in significantly better fruit set than removal of sepals, petals and stamens. A better set was obtained from bagged flowers than from non-bagged flowers or those with stigmas covered in lanolin and paraffin oil. Maximum fruit and seed set was obtained from flowers pollinated and bagged at the balloon stage. Lanolin treatment of stigmas slightly decreased fruit set in comparison with untreated flowers when pollination occurred at the balloon stage. Vaseline treatment of stigmas, tested with 6 plant species, also gave fairly good results. Self-incompatibility in apple and pear was not overcome by pollination at the bud stage, or by α-naphthaleneacetamide application. Reciprocal crossings between

parthenocarpic apple and pear varieties, with or without application of growth substances or boric acid, produced only a few viable seeds. The growth substances used hardly affected germination or tube growth of pear pollen *in vitro*, and only moderately affected that of apple pollen. Boric acid stimulated germination to a far greater extent.—Lab. Tuinbouwpl., Wageningen.

1426. Roberts, D., and Congdon, N. B.
The relationship of nectar secretion (volume) and sugar concentration to insect pollination of plums (*Prunus* spp.).
N.Z. J. Sci. Tech., Sect. A, 1955, **37**: 196-206, bibl. 1.

Pollination studies were carried out at Auckland on Billington and Purple King plums, which are unreliable croppers, during the flowering seasons of 1951–54. Bees were attracted to plum blossom only during favourable weather. Attraction was directly related to proximity of the hive, which should be within 150 yards. Bee attraction to plum blossom was greatest at periods of maximum nectar secretion and low sugar concentration. In all orchards observed plum was liable to competition from stands of plants yielding nectars with sugar concentrations up to 3 times that of plum. Plum pollen was not sufficiently attractive to other pollen-gathering insects to ensure effective pollination.

1427. Shuel, R. W.
Nectar secretion.
Amer. Bee J., 1955, **95**(6): 229-34, from *Bee World*, 1956, **37**, abstr. 16/56.

This is a brief review of plant sources of nectar, extra-floral nectaries, sugars and other components of nectar, the role of bees in pollination and internal and external conditions affecting nectar secretion. The effects on nectar secretion of air temperature, soil conditions (including fertilizers), precipitation and soil moisture, altitude and hereditary variations are discussed.—Ontario agric. Coll., Guelph. [See also *H.A.*, 25: 2432 and abstract 14681.]

1428. Maurizio, A.
Secretion de nectar des plantes polyploides.
Nectar secretion in polyploid plants.
Proc. VIIIth Congr. int. Bot., **1954**, Sect. 10, p. 216, from *Bee World*, 1955, **36**, abstr. 295/55.

Polyploid plants were found to secrete 1·5–4·0 times as much nectar (per flower and per 24 hr.) as diploid plants, and 1·3–4·4 times as much sugar (per flower per 24 hr.). The ratios fructose/glucose and sucrose/(fructose+glucose) were lower in nectar from polyploid plants.—Bienenabt., Liebefeld-Bern, Switzerland.

1429. Vansell, G. H.
Variations in nectar and pollen sources affect bee activity.
Amer. Bee J., 1952, **92**(8): 325-6, from *Bee World*, 1956, **37**, abstr. 9/56.

Variations occur in the percentages of sucrose, laevulose and dextrose, as well as in the total sugars, present in nectars of various plants. Examples are given from plants grown in the Western United States. Mustards (*Sinapis* spp.) with nectar containing 44–60% sugars, which were planted as cover crops in orchards, attracted bees away from plum and pear (12% sugars). *Acer* sp. (52% sugars) attracted bees away from pear and even from the copious nectar of *Arbutus menziesii* (15% sugars). Average concentrations of total sugars in the nectars of 15 plants are tabulated. Bees ordinarily prefer mustard (50% sugars) to orange nectar, which has about 16% sugars when freshly secreted; however, dry winds may evaporate the latter until it contains up to 40% sugars, and thus make it very attractive to bees, especially in the afternoon. Bees visited sweet, but not sour, cherries in the same orchard (55 and 20% sugars). Of plum varieties grown side by side 3 showed no collectable nectar and 8 others had nectar containing from 10 to 28% sugars.—U.S. Bur. Ent. and Plant Quar., Davis, Calif.

Growth phenomena.

(*See also* 1507.)

1430. Servicio Meteorologico Nacional.
(Phenological notes for 1953) [in Spanish].
Bol. fenol. Argentina, 1953 (1954), Nos. 11/12, pp. 7, tables and graphs.

Useful information is given on the average date of flushing, flowering and fruiting of a number of fruit and ornamental trees and other plants in Buenos Aires.

1431. Ruggiero, R. A.
La floración del manzano y su relación con las temperaturas invernales en el alto valle del Río Negro. **(Apple flowering in relation to winter temperatures in the upper valley of the Rio Negro.)** [English summary 7 lines.]
Meteoros, 1955, **5**: 141-54, bibl. 13.

Flowering in 70 apple varieties was studied in relation to winter temperatures (April–August) in 1935, 1936 and 1937. Conclusions reached were: (1) Flowering was delayed when the number of "cold hours" (below 7° C.) was below normal, and advanced when it was above normal, especially in late varieties. (2) The interval between the inception of flowering in the earliest and in the latest varieties was less in years in which the number of cold hours was above normal. (3) The duration of flowering was less in late than in early varieties, varied widely from year to year in early varieties and varied little from year to year in late varieties. (4) In years in which the number of cold hours was above normal the duration of flowering was short and showed the least variation from variety to variety. (5) There was a negative correlation between the number of cold hours before the inception of flowering and the duration of flowering.

1432. Rudloff, C. F., and Feucht, W.
Morphologische Studien an Infloreszenzen von "Spätblühender Taffetapfel". **(Morphological studies on inflorescences of "Spätblühender Taffetapfel".)** [German, English, French and Spanish summaries 4 or 5 lines each.]
Mitt. Klosterneuburg, Ser. B., 1955, **5**: 275-9, bibl. 6.

Variation in inflorescence morphology increased with later blossoming. The characteristics of the first inflorescence to flower are considered to be the most valuable.

1433. Brown, D. S.
Temperatures in relation to deciduous fruit production.
Food Tech., 1955, **9**: 409-11, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2765.

A review of work on the prediction of harvest dates for fruits from the temperatures prevailing during development, with special reference to peaches and apricots grown in California.

1434. Tumanov, I. I., and Gareev, E. Z.
The effect of fruiting organs on the mother plant. [Russian.]
Trudy Inst. Fiziol. Rast. Timirjazeva, 1951, **7**(2): 22-108, bibl. 59, illus.

A study was conducted on the effect of fruiting in the first case on the vegetative growth and life of plants and in the second on the generative processes and biennial bearing. It was shown that fruiting inhibits or suppresses vegetative growth and results in the immediate death of annual plants and a slow ageing of fruit trees. The effect of fruiting organs on flower bud differentiation and bearing was studied on apple trees at Frunze in Kirgizstan by the application of ringing, pruning, mechanical flower or fruit thinning, core removal and growth substance treatments. Among other things noted was that on a 2-year-old fruiting branch piece with 5–9 spurs, ringed at both ends, the position of the fruit affected bud formation. Thus spurs in the immediate proximity of the fruit(s) did not produce flower buds; when the fruit occurred in the middle or at the bottom of the branch the uppermost spurs produced flower buds, and when at the top the lowest spurs. By removing all leaves from the fruit-bearing spur in the middle of the branch the order of bud formation was reversed and the lowest spurs produced the flower buds, a fact that emphasizes the importance of the function of the leaves. Differences in varietal reaction to the various treatments were noted and means of controlling biennial bearing by cultural methods and by reducing the number of flower buds during the on year are summarized.

1435. Schander, H.
Über die Veränderlichkeit der Fruchtgestalt bei der Birnensorte "Conférence". **(Variability of fruit form in Conference pear.)**
Mitt. ObstbVersuchringes Jork, 1955, **10**: 271-7, bibl. 23, illus.

The relationship between fruit shape and seed development in Conference was studied. At low length/breadth ratios (round fruits) greater numbers of seeds reached full development. Columnar fruits contained undeveloped and partially developed seeds. It is suggested that an early interruption of embryo development affects fruit shape to a greater extent than a late interruption.

1436. Borck, B.
Einfluss der Himmelsrichtung beim Verpflanzen junger Obstgehölze. **(The influence of orientation at transplanting on young fruit trees.)**
Dtsch. Gartenb., 1956, **3**: 14-15, bibl. in text.

In an experiment with cherry [*Prunus avium*?] no effect on trunk girth or shoot growth was observed from a change of orientation at transplanting.—Inst. Gartenb., Dresden-Pillnitz.

1437. Butijn, J.
Wortelgroei in gronden, bestaande uit een bovengrond van klei en een ondergrond van zand. VII. De beworteling van vruchtbomen op profielen met een dunne kleilaag op zand. **(Root growth in soils composed of a clay topsoil and a sandy subsoil. VII. Rooting of fruit trees in profiles with a thin clay layer on sand.)** [English summary 7 lines.]
Versl. landbouwk. Onderz. **61.7**, 1955, pp. 114-21, bibl. 3, figs.

In profiles consisting of a thin clay layer overlying sea sand, shallow rooting of apple trees has been observed. These trees are small and have reduced fruit yields, especially in dry summers. Shallow rooting is caused by the low porosity of the soils, combined with a low nutrient status and an unfavourable water economy. [See also popular article by same author in *Fruitteelt*, 1956, 46: 14-15.]

1438. Kemmer, E.
Beobachtungen an Wurzelkörpern von Apfelgehölzen. **(Observations on apple tree root systems.)**
Züchter, 1956, **26**: 1-2, bibl. 5, illus.

Observations made over several years on root systems of generatively- and vegetatively-propagated apple trees are presented. The shallow roots of older trees are generally little affected by soil properties. In a porous, deep soil roots of older trees exploit the levels penetrated by roots of an earlier stage. This "transition" occurs in all trees. In undisturbed seedlings roots reach their greatest depth about the fifth year. Primary roots become more stunted with increasing age. The primary root system is obstructed by "transition roots" and may become completely choked. In undisturbed seedlings this process is slower than in transplanted or root-pruned seedlings, or in vegetatively-propagated trees. The first "transition" roots are often curved deep roots which generally outlive the primary deep roots, although remaining behind the shallow roots in development. In vegetatively-propagated trees the "transition" roots are mostly shallow. Three series of roots have been recognized: (1) a lower series of primary deep roots, (2) a middle series of curved roots, and (3) an upper series of shallow roots. Root systems of vegetatively-propagated trees may be divided into (1) a lower series of adventitious roots, and (2) an upper series of later adventitious roots. The weight ratio of above- and below-ground parts of the tree changes with age in favour of the crown. By supplying the tree with nutrient through the trunk, root growth was suspended, but roots remained

productive and later developed normally. There was no apparent effect of scion variety on the root system in young plants.—Inst. Obstb. Berlin.

Spraying for cultural purposes.

1439. Wurgler, W., and Aubert, P.
Effet de l'éclaircissage des jeunes fruits sur la qualité des pommes et sur l'alternance. **(Effect of fruit thinning on apple quality and biennial bearing.)** [German, English and Italian summaries.]
Landw. Jb. Schweiz, 1955, **4**: 809-14, bibl. 2.

Applications of NAA (8 g. in 100 litres) applied at petal-fall or 10 days later to Belle de Boskoop trees have prevented biennial bearing for at least 3 seasons. A concentration of 5 g. NAA in 100 litres, applied 10 days after petal-fall to Golden Delicious trees, gave better results than a concentration of 3 g./100 litres. Fruit size was increased, no leaf injury was observed and cold storage behaviour of fruits was unaffected.—Lausanne. [See also *H.A.*, 25: 155.]

1440. Lott, R. V., and Rice, R. R.
Effect of preharvest sprays of 2,4,5-trichlorophenoxypropionic acid upon the ripening of Jonathan, Starking, and Golden Delicious apples.
Bull. Ill. agric. Exp. Stat. **590**, 1955, pp. 30, bibl. 17.

An evaluation was made of the effects of preharvest applications of 2,4,5-TP on quality and condition during ripening of Jonathan, Starking and Delicious apples. In general there was no difference in quality or condition during ripening of treated fruits harvested while immature. The lower quality of treated Jonathan and Starking fruits harvested at maturity persisted throughout ripening. There was an indication that 2,4,5-TP could increase development of Jonathan spot. Many treated fruits of Golden Delicious cracked or became abnormally soft on the trees by the time of maturity, and these were rejected at harvest. Quality of Golden Delicious fruits which were stored became progressively lower throughout the storage period. With apples post-ripened at 75° F. the quality of all varieties deteriorated rapidly during the 7-day period. Treated samples of mature and post-mature fruits, especially of Golden Delicious, showed more rapid deterioration in quality than the controls. There was little difference in quality between control and treated samples in immature pickings.

1441. Crane, J. C.
Current status of hormones in Calimyrna fig production.
Proc. 9th annu. Res. Conf. Calif. Fig Inst., 1955, pp. 7-8.

Experiments on the use of growth substances for the setting of figs without caprification began in 1947. The unacceptability to the public of seedless figs was among the difficulties experienced, but it was found that benzothiazolyl-2-oxyacetic acid and some of its derivatives caused the development of the unfertilized "seeds" in uncaprified figs. In small-scale experiments in 1954 sodium 2-benzothiazolyloxyacetate and butyl 2-benzothiazolyloxyacetate set and matured over 90% of the figs sprayed, these figs containing seeds and being quite similar to caprified figs when mature. Experiments are also being made with 2,4,5-T and other substances (1) to advance maturation and to cause all the figs on a tree to mature at about the same time, and (2) to control suckers at the base of the trunk.

Nutrition and soil management.

(*See also* 1353, 1468a, i.)

1442. Shibukawa, J., and others.
Studies on leaf analyses of apple trees. I. A leaf analysis survey of apple orchards. (1), (2) and (3). [Japanese, with English summaries 1½, 1 and ½ pp.]
Misc. Publ. Aomori Apple Exp. Stat. **4**, 1954, pp. 36, bibl. 13, illus.,* **5**, 1955, pp. 12, bibl. 4, and **6**, 1955, pp. 8.

Leaf samples of Ralls, Jonathan and Delicious were taken in July/August in 1952, 1953 and 1954 in several hundred orchards in Aomori Prefecture as part of a general investigation on apple nutrition. Their average NPK contents were: Ralls 1952/54—3·38, 3·53 and 3·43% N, 0·20, 0·18 and 0·21% P and 1·51, 1·44 and 1·61% K; Jonathan 1952/54—3·05, 2·93 and 3·11% N, 0·19, 0·17 and 0·20% P and 1·27, 1·27 and 1·39% K; Delicious 1953/54—3·21 and 3·29% N, 0·19 and 0·23% P and 1·60 and 1·73% K. No correlations were found between the leaf contents of young and older trees, between leaf contents and soils except that K was lowest on alluvial soils, or between leaf contents and fertilizer applied during the year. It was concluded after the first year's survey that the critical leaf contents of NPK for Ralls in Aomori Prefecture are 2·30, 0·11 and 1·20% respectively.

1443. Proebsting, E. L., and Warner, R. M.
Leaf absorption of nutrients by fig trees.
Proc. 9th annu. Res. Conf. Calif. Fig Inst., 1955, pp. 9-14.

In nutrient spray experiments on Calimyrna figs in 1952/54: (1) N was absorbed from urea at 5 lb. per 100 gal. water and from ammonium phosphate at 6 lb. without leaf injury. (2) Phosphate was not absorbed when the leaves were immature, but there was considerable intake from mid-May for 6 weeks, an important finding, since application of phosphates to the soil in most parts of California results in little uptake. (3) Application of 200 and 400 pounds per tree of tungsten tailings to the soil proved to be neither beneficial nor harmful. (4) A dormant spray of zinc sulphate applied in the spring of 1954 had no effect on growth or fruit. Data are presented on yield, quality, growth and fruitset.

1444. Hulme, A. C.
The nitrogen content of Cox's Orange Pippin apples in relation to manurial treatments.
J. hort. Sci., 1956, **31**: 1-7, bibl. 4.

Data are presented for the total, soluble and protein N contents of 2 series of Cox's Orange Pippin samples. One series consisted of fruit from comparable trees receiving N and K_2O fertilizers on both grassed-down and cultivated plots, and the other series consisted of fruit from commercial orchards in different parts of England. Both total and protein N in the fruit was

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increased by ammonium sulphate applications; the N content was further increased if K_2O was also given. The N content of the fruit was lower from grassed-down plots than from cultivated plots. The total N content of the fruit varied widely over the 2 series, although the protein N differences were more limited. It is suggested that with a N content of 30 mg. per 100 g. fresh weight, most of the N would be in the form of protein and that above this value soluble N increases twice as rapidly as protein N. [From author's summary.]—Ditton Lab., D.S.I.R.

1445. Hewetson, F. N.
Nitrogen starts peach replants.
Sci. for the Fmr, 1955, **3**(2): 7.

Increases in trunk diameter of 46·8% and 41·7% were obtained in young peach replants with nitrate of soda and "Ra-Pid-Gro" respectively. On the controls the increase in diameter was 13·3%. Chlorophyll contents of the leaves were also measured, and those of the controls were about half those of fertilized trees.

1446. Hannigan, M. A.
Green manuring in the granite belt.
Qd agric. J., 1955, **81**: 269-72, illus.

Green manuring is widely practised in deciduous orchards in the Stanthorpe district in the winter months. The chief green manure crops grown are New Zealand blue lupin, golden tares and black winter rye. Notes are given on time and rates of sowing, fertilizing and turning in.

1447. Butijn, J.
Het bodemkundig onderzoek. (**Soil research.**) [English summary ½ p.]
Jversl. Proefstat. Fruit, Volle Grond, Wilhelminadorp, 1954, 1955, pp. 27-31, illus.

Soil moisture: a root layer of only 40 cm. was not sufficient for fruit trees; the height of the water table in May was chiefly responsible for the depth of rooting; a water table of about 0·5 m. below the surface from November to March is about the highest that an apple tree can endure. *Mineral nutrition:* in neither a calcareous nor an acid soil did a heavy lime dressing result in Mg deficiency symptoms; chelates have not corrected Fe deficiency. *Cover crops:* grass rooted more deeply when mowed once a month than when mowed once a fortnight; urea sprays did not satisfactorily compensate for grass growth in a pot experiment with apple rootstocks.

1448. Hendrickson, A. H., and Veihmeyer, F. J.
Results of sprinkling in a fig orchard.
Proc. 9th annu. Res. Conf. Calif. Fig Inst., 1955, pp. 14-15.

Calimyrna figs on sandy loam received sprinkler irrigation during the early spring of 1954 to supplement winter rainfall, and again in early July when the moisture content of the soil in the top 3 feet had been reduced to the permanent wilting percentage, the summer application resulting in the irrigated trees having available moisture for about a month longer than those in the dry plot. Fruit samples taken from the irrigated plot on 4 and 15 September were 22% and 7% respectively heavier than those from the unirrigated plot. Irrigation did not affect quality.

Harvesting and packing.

(*See also* 1468h.)

1449. U.S. Department of Agriculture.
Apple handling made easier.
Agric. Res., 1955, **4**(3): 13, illus.

In a method being tested in Michigan 3 crews pick the base, centre and top respectively of dessert and other apple trees in that order. The fruit is "poured into" 20-bushel pallet crates which are transported about the orchard on low-hung tractor-drawn trailers and fork-lifted onto and off the lorries which carry the fruit to the processing or storage plant. The system promises an increase in picker efficiency of 5-10%.

1450. Anon.
Straddle trucks and other methods of hauling apples to a pallet plant.
Apple Res. Digest, 1955, No. 107, pp. 1-3, illus., and No. 108, pp. 1-3, illus.

In Washington State straddle trucks have been used commercially for hauling fruit boxes from orchard to warehouse. Loads of fruit can be picked up and released with virtually no labour costs. The straddle trucks can carry a complete truckload at one time, and can travel on roads as quickly as trucks. Advantages of straddle trucks are enumerated. The biggest disadvantage is the high cost. Several of the newer methods of hauling fruit are illustrated and described, and labour efficiency is compared.

1451. Bedford, C. L., and Robertson, W. F.
Harvest maturity and ripening of peaches in relation to quality of the canned and frozen products.
Tech. Bull. Mich. agric. Exp. Stat. **245**, 1955, pp. 31, bibl. 7.

Peaches harvested when requiring 3–7 days' ripening for processing gave the best quality and yield of both canned and frozen products. Results indicated that peeled peaches of more than 12 lb. pressure when tested with a $\frac{5}{16}$-inch plunger did not ripen to give a high quality product. Ground colour was not a reliable index of maturity owing to its seasonal fluctuation. Weight, ring size, circumference and diameter all indicate peach maturity, but could not be used as a means of the determining maturity at which the fruit should be harvested. Peaches ripened at 70–75° F. were found to have the best quality, which was maintained over a relatively long period of ripening. Higher ripening temperatures resulted in the development of an undesirable flavour, especially after long storage periods at high relative humidity. [For shorter account see *H.A.*, 25: 3589.]

1452. Kilbuck, J. H.
Studies of the characteristics of prunes as related to date of harvest.
[*Publ.*] *Univ. Calif.*, 1954, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **ARS-74-5**, 1955, p. 4.

In studies on freshly harvested and dehydrated prunes the best average quality resulted from beginning harvest about 7 to 10 days after the disappearance of chlorophyll and when soluble-solids content had reached about 24%. [See also *H.A.*, 26: 223.]

1453. D'Ersu, P., and Swinzow, H.
Évolution des abricots Canino au verger et en chambres froides; aptitude de ces fruits à la préparation de conserves appertisées durant la campagne 1954 au Maroc. **(Canino apricots: their maturation in the orchard and the cold store and their suitability for canning during the 1954 season in Morocco.)**
Fruits d'Outre Mer, 1955, **10**: 469-81, bibl. 5, illus.

In investigations on picking maturity, prestorage temperature and canning, fruit was picked at the colouring, mature and over-mature stages and cold-stored at 0, 5 and 10° C. before canning. The general conclusions were: (1) Picking at maturity gave the best results. (2) Of the maturity tests made in the field and during cold storage the most reliable were estimations of colour, hardness of flesh, dry extract, acidity, reducing sugars content and the reducing sugars/acidity ratio. (3) The higher storage temperatures caused some increase in maturation but reduced the possible duration of prestorage. Fruits picked at the mature stage could be prestored for a week at 10° C. or for 1–3 weeks at 5° C., the limiting factors being consistency, flavour and browning.

1454. Levin, J. H., and Gaston, H. P.
Prepackaging apples in film bags.
Spec. Bull. Mich. agric. Exp. Stat. **396**, 1955, pp. 19, bibl. 3, illus.

Information on equipment, layout and methods used in prepackaging apples has been collected and is set out for growers and shippers. In Michigan, great variations were found in the amounts of capital investment in equipment per worker, in time required for packing 100 bags, and labour and equipment costs of packing 100 bags. Three different filling methods were used, namely, by hand, by chute and by machine, and these are discussed. Various aids to apple bagging are described. It is concluded that efficiency of most of the operations could be increased by better use of mechanical aids, by more effective arrangement of equipment, and by maintaining a continuous supply of fruit at bagging stations.

Storage.

1455. Wright, R. C.
Home storage of vegetables and fruits.
Fmrs' Bull. U.S. Dep. Agric. **1939**, revised 1955, pp. 18, illus., 10 cts.

Storage in cellars and pits is described. Storage recommendations are included for legumes, late cabbage, cauliflower and broccoli, late celery, endive, onions, parsnips, pumpkins and squashes, miscellaneous root crops, apples and pears, grapes, peaches and plums.

1456. Society of Chemical Industry (Members of the Food Group).
Food.
Reps. Progr. appl. Chem., 1954, **39**: 846-85, bibls.

Including sections on fruit and vegetable storage (physiology and metabolism—bibl. 62) and on frozen fruits and vegetables.

1457. Lentz, C. P.
Humidification of cold storages: the jacket system.
Canad. J. Tech., 1955, **33**: 265-78, bibl. 5.

Basic principles of maintaining high relative humidity in cold stores are outlined.

1458. Hall, E. G.
The use of ozone in fruit stores.
Fruit Pres. Quart., 1955, **15**: 66-8, bibl. 18.

Under suitable conditions ozone removes many odours and controls surface mould, but does not reduce fruit rotting or have a marked effect on storage disorders. It may be useful in improving storage when ethylene removal is specifically required. There are some indications that ozone may prevent tainting of different types of fruit stored together.

1459. Phillips, W. R., and Poapst, P. A.
Controlled atmosphere storage of apples.
Suppl. [*Mimeo.*] *Publ. Canada Dep. Agric.* **776**, [1955?], pp. 7.

This supplement is concerned with constructional modifications to gas stores. [For the main publication see *H.A.*, 23: 2660.]

1460. Wright, R. C., and Whiteman, T. M.
Some changes in Eastern apples during storage.
Tech. Bull. U.S. Dep. Agric. **1120**, 1955, pp. 54, bibl. 7.

Apple varieties were stored at 31° F. for varying periods which were followed by a week at 70° F. to simulate market conditions. A comparatively high quality rating was retained in Grimes Golden after 8–9 weeks' storage, in Golden Delicious after 16–18 weeks, in Delicious after 26–28 weeks and in Winesap, Stayman and York Imperial after about 30 weeks. Reducing sugars tended to increase during storage while sucrose increased only during the first 1 or 2 months. Total sugars increased while acidity decreased during storage. In general the greatest volume of juice was found after storage in Winesap, Delicious, Jonathan, Yellow Newtown and York Imperial varieties in that order. In varieties which tended to become mealy the juice volume was less.

1461. Pastoriza, R., and Cordoba, O. G.
Temperaturas de congelación de manzanas Rome Beauty en el curso de su conservación frigorífica. **(The freezing temperatures of Rome Beauty apples during cold storage.)**
Rev. Invest. agríc. B. Aires, 1955, **9**: 357-67, bibl. 12.

Samples from Rome Beauty apples cold-stored for 8 months at 0–1° C. and 78–82% R.H. were taken at intervals of about 2 months and exposed to a temperature of −5° C. for 6 days. The freezing temperature fell from −1·99° C. immediately after harvesting to −2·41° C. at 71 days after harvesting and then rose gradually to −2·1° C. at 258 days after harvesting, the final sampling date.

1462. Padfield, C. A. S.
Factors affecting incidence of superficial scald in the Rome Beauty apple and its coloured sport, Frimley Beauty.
N.Z. J. Sci. Tech., Sect. A, 1955, **37**: 312-17.

Development of superficial scald on Frimley Beauty and Rome Beauty apples was studied over a period of 4 years in relation to time of picking, delay between harvest and storage, and the use of oiled wrappers. There were indications that early picking (late March) favoured scald development. Delay between picking and cool storage in general caused a marked increase in the incidence of scald. Oiled wraps did not eliminate scald, but their use consistently reduced the percentage loss. [From author's summary.]—Fruit Res. Stat., D.S.I.R., Havelock North.

1463. DANA, M. N.
Polyethylene liners for apple storage.
Wis. Hort., 1956, **46**: 136-7, illus.
Reports have been collected from growers on the use of polyethylene liners for storage of Golden Delicious, McIntosh, Golden Russet, Delicious, Stayman and Cortland apples. Polyethylene bag storage was found to be desirable for varieties that shrivelled in refrigerated or common storage. It was most effective for varieties that will keep well and are normally stored for a long period.

1464. BÖMEKE, H.
Der Einfluss imprägnierten Holzes auf Äpfel. **(The effect of impregnated wood on apples.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 278-9, bibl. 1.
Wood impregnated with preservatives was stored in close contact with stored fruit. The most suitable preservatives for use in stores appeared to be the U-salts [Basilit U Special, Corbal U and Wolmanit U]. Silico-fluoride may be used for preserving the woodwork of the store, but not for boxes. [Names of preservatives taken from article abstracted in *H.A.*, 25: 2511.]

1465. PADFIELD, C. A. S.
The cool storage and export of New Zealand grown Williams' Bon Chrétien pears. I. The effect on keeping quality of soil type, picking date, and delay between harvest and cool storage.
N.Z. J. Sci. Tech., Sect. A, 1955, **37**: 229-37, bibl. 2.
Williams' pears were successfully exported to the U.K., arriving after storage at 30–32° F. for 50 days in a hard green condition. In fruit held for a similar period in New Zealand, storage quality was affected by soil type. Prompt cool storage after harvest was essential. Cool-stored Williams', when handled after ripening, almost immediately develop an unattractive dark-brown, scaled discoloration of the skin.—Fruit Res. Stat., D.S.I.R., Havelock North.

1466. PADFIELD, C. A. S.
The cool storage and export of New Zealand grown Williams' Bon Chrétien pears. II. Ripening after cool storage.
N.Z. J. Sci. Tech., Sect. A, 1955, **37**: 238-40, bibl. 1.
Williams' pears, which were hard and green when removed from store after 50 days at 30–32° F., ripened satisfactorily when held for a further 7 days at 50–55° F. Pears held for a similar period at 40–45° F. did not ripen, and at 60–65° they became overripe. [From author's summary.]—Fruit Res Stat., D.S.I.R., Havelock North.

1467. DAGHETTA, A., FORTI, G., AND MONZINI, A.
Il problema dei prodotti di respirazione delle frutta conservate in celle frigorifere. Nota III. Richerche sui composti odorosi volatili emessi da pesche "Hale" durante la maturazione alle temperature di 3° C. a 20° C. **(The problem of the products of respiration of fruit in cold storage. III. Research on the volatile compounds given off by Hale peaches during maturation at 3° and 20° C.)** [English summary 4 lines.]
Ann. Sper. agrar., 1956, **10**: 321-7, bibl. 8.
Information is given on the amounts and rates of production of esters, alcohols, acids and carbonyl compounds.—Staz. sper. Freddo, Milano.

Noted.

1468.

a VAN ALPHEN, T. G.
Bespuiting met borium op verschillende gewassen. **(The application of boron sprays to various crops.)**
Landbouwk. Tijdschr., 1955, **67**: 761-80, bibl. 64.
Included in this review are references to apples, grapes and apricots.

b DE ARIÑO, A.
Contribución al conocimiento de la flora apícola. **(Bee plants [in Argentina].)**
Gaz. Colm., 1954, **16**(188): 2-10, from *Bee World*, 1955, **36**, abstr. 294/55.

c AUSTRALIA.
Thirty-first Annual Report of the Commonwealth Dried Fruits Control Board for year 1954-55, Melbourne 1955, pp. 22.

d BLASSE, W.
Radioaktive Isotope in der Obstbauwissenschaft. **(Radioactive isotopes in fruit research.)**
Dtsch. Gartenb., 1956, **3**: 19-20.

e FARMER, A.
Training of apple trees. Details of oblique cordon system.
N.Z. Gdnr, 1955, **12**: 285-91, bibl. 5, illus.

f GAGNIEU, A.
Étude d'une collection de variétés de pommier cultivées en France. Comportement caryologique et caractères du pollen. **(Study of a collection of apple varieties grown in France. Caryological and pollen characters.)**
Ann. Amél. Plantes, 1955, **5**: 237-45.
The collection at the Centre de Recherches Agronomiques at Clermont-Ferrand.

g HARPER, R. S.
A study of canning peach growing in California [contd.].
J. Agric. Vict., 1955, 511-21, 564-71, bibl. 58, illus.
Continues article abstracted *H.A.*, 25: 2419.

h HARRIS, R. G., AND LEE, W. A.
Effects of methods of packaging apples on costs and returns to Pennsylvania growers, 1954.
Progr. Rep. Pa agric. Exp. Stat. **141**, 1955, pp. 6.

i KURUP, C. N.
The influence of manuring on the flavour of fruits and vegetables.
South Indian Hort., 1955, **3**: 60-70, bibl. 43.
A review.

j DE MIGOYA, A. E. DE E.
Levaduras aisladas de ciruelas maduras. (Segunda parte.) **(Yeasts isolated from ripe plums. II.)** [English summary 7 lines.]
Rev. Invest. agríc. B. Aires, 1955, **9**: 177-86, bibl. 4.
For Part I see *H.A.*, 22: 203h.

k PAPASOLOMONTOS, A.
Fruit-tree planting.
Countryman, Nicosia, December 1955, pp. 4-5, illus.
Apples, pears, plums and cherries in Cyprus.

l SHUEL, R. W.
Studies of nectar secretion in excised flowers. I. The influence of cultural conditions on quantity and composition of nectar.
Canad. J. Bot., 1956, **34**: 142-53, bibl. 12, illus.
Apic. Dep., Ont. agric. Coll., Guelph.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 1377, 1393, 1510f, k-m, o, s, 1677, 1837b.)

1469. DUGGAN, J. B.
Permanent cover crops for black currants and raspberries.
Agriculture, Lond., 1955, **62**: 417-20, illus.
Experience gained in Herefordshire is discussed with reference to grassing down plots of black-currants and raspberries on farms where the average annual rainfall is 27 inches. Of the grasses used S.50 timothy, S.59 red fescue and *Agrostis tenuis* were the most satisfactory in forming a soil cover. A straw mulch was spread round the black-currant bushes over a radius of 1 foot, but the raspberries were not mulched. The grass was cut frequently up to the time of picking, and again afterwards. Yields were reduced on only one blackcurrant plot, where the soil was light and a straw mulch had not been given. Costs of cultivation and picking were reduced by grassing down.

1470. TREVETT, M. F.
Some growth habits of the low-bush blueberry.
Maine Fm Res., 1955, **3**(3): 16-18.
Growth studies show that: (1) In general the first shoots to emerge after burning are taller and have more fruit cluster buds per stem than stems that emerge later. (2) Tall, vigorous stems usually have more blossom buds per cluster bud than do short stems of the same clonal type. (3) Stem length is affected by date and intensity of burning, soil moisture and N fertilization. (4) Laterals are produced by some clones in the year of burning, and this increases the fruiting area of the stem. (5) Lateral development can be induced by mechanical injury of the growing tip early in the season or by hormone treatment in the late autumn before a spring burn. (6) The rate of growth of laterals is directly related to N supply.

1471. BELL, H. P., AND BURCHILL, J.
Flower development in the lowbush blueberry.
Canad. J. Bot., 1955, **33**: 251-8, bibl. 7, illus.
In the lowbush blueberry floret primordia appear during June. Floral parts appear in acropetal succession during July. The flower is mature by the last week in May. [From authors' abstract.]—Nova Scotia Res. Foundation.

1472. SEEGMILLER, C. G., AXELROD, B., AND MCCREADY, R. M.
Conversion of glucose-l-C^{14} to pectin in the boysenberry.
J. biol. Chem., 1955, **217**: 765-75, bibl. 22.
Almost mature but still green boysenberries were permitted to imbibe glucose-l-C^{14}. Examination of the "pectin" constituents after 2 or 3 days' incubation revealed the galacturonic acid and arabinose to be labeled. The largest percentage of the radioactivity was found in the aldehydic carbon atom and amounted to about 40 to 60% for the galacturonic acid and about 90 to 95% for the arabinose. These results suggest that glucose is converted to the galacturonic acid and the arabinose moieties without cleavage of the carbon chain. [Authors' summary.]—Agric. Res. Serv., U.S. Dep. Agric., Albany, Calif.

1473. JOHNSTON, R. E., AND STORRIE, D. L.
Gooseberries.
Adv. Leafl. Dep. Agric. Scot. **13**(n.s.), revised 1955, pp. 6, illus., 1s.
Cultivation, varieties and control of aphids, sawfly, American and European gooseberry mildews, cluster cup rust and die back or grey mould.

1474. SWARBRICK, T.
Improving the raspberry.
Agric. Rev., 1956, **1**(9): 25-30, illus.
Information is given on raspberry growing in Scotland and on the raspberry research programme at the Scottish Horticultural Research Institute, Mylnefield, as follows: raspberry growing districts, cultural methods, varieties (chiefly Malling Promise and Lloyd George in the Fife-Angus-Perth area and Burnetholme Seedling in Clyde Valley, which is the other main area, breeding to raise improved varieties combining high yield with good processing characters, and control of virus disease by heat therapy.

1475. Williams, I. H., and Hudson, J. P.
A quick method of vegetative propagation.
Gdnrs' Chron., 1956, **139**: 34-5, bibl. 5, illus.
Studies on a quick method of raspberry propagation are described [see also *H.A.*, 24: 206 and 25: 3410]. A large number of plants can be propagated in one year from a small initial stock by taking root cuttings. The method may be used to produce uniform young plants for research work, to build up clonal material or to bring plants rapidly into fruiting by ensuring rapid establishment of young plants in their first year after planting.—Dept. Hort., Univ. Nottingham.

1476. Papasolomontos, A.
Strawberries.
Countryman, Nicosia, November, 1955, pp. 7, 22, illus.
Experiments on strawberry growing in Cyprus are being made at the Trikoukkia station with the varieties Royal Sovereign and Lassen. The subjects discussed include irrigated culture and suitable soils, elevation and localities.

1477. Gerritsen, J. D., and others.
Is uitbreiding van de aardbeienteelt gewenst? **(Should strawberry cultivation be extended?)** [English summary ½ p.]
Med. Dir. Tuinb., 1955, **18**: 918-32, illus.
A committee has reported on the present state of strawberry cultivation in the Netherlands. The post-war extension of acreage appears to have stopped, although cultivation in well-managed plantations has been a paying proposition. Production may be increased either by extending the area under cultivation, although this is only practicable where there is a labour surplus, or by increasing production per acre which should give a reduction in cost price. Large-fruited strawberry varieties should be selected so that labour requirements during harvest may be reduced.

1478. Steyn, P. A. L.
Strawberry breeding in South Africa.
Fmg S. Afr., 1955, **30**: 395-400, 406, illus.
Many of the world's best and most popular strawberry varieties have not been a success in South Africa. This is probably due partly to the poor adaptability of strawberry plants, and partly to their susceptibility to virus diseases. Virus-tolerant varieties bred locally were considered to have the best chance of success in South Africa, and in 1940 a breeding programme was started. Three of the resultant hybrids, comparing favourably with the main commercial variety, Everbearing, have been selected and named Bien Donne No. 1, No. 2, and No. 3. The new varieties are described, with illustrations of their fruits.—West. Prov. Fruit Res. Stat.

1479. Gardner, R.
New Cambridge varieties give dramatic results.
Grower, 1955, **44**: 1469.
In trials in Wales, Cambridge Vigour and Cambridge Rival gave the best results on some old-established strawberry fields. The use of the matted row system gave a 35% yield increase in 2 seasons. Trials with Crag Herbicide No. 1 have been encouraging.

1480. Arney, S. E.
Studies of growth and development in the genus *Fragaria*. VII. The effect of defoliation on leaf growth.
Phyton, 1955, **5**: 93-105, bibl. 5.
Plants have been defoliated by removing one, two or three of the youngest emerged leaves and by removing all leaves; aqueous solutions of indole acetic acid have been applied to some of the defoliated plants. It is shown that indole acetic acid can act as a substitute for the leaves removed in defoliation, and a hypothesis is developed to explain the way in which photoperiod, auxin and defoliation exert their influence on cell number and cell size, and hence on leaf size. No effect of defoliation on leaf initiation could be detected. [Author's summary.]—Univ. Coll., Cardiff. [See also *H.A.*, 25: 2529, 2530.]

1481. Smeets, L.
Runner formation on strawberry plants in autumnn and winter. II. Influence of the light intensity on the photoperiodical behaviour. [Dutch summary ⅓ p.]
Euphytica, 1955, **4**: 240-4, bibl. 2.
Factors affecting runner production of Deutsch Evern during autumn and winter were studied. The plants were kept in long-day conditions at 3 temperatures, with light intensity increased, either during daylight, or during application of supplementary light, or both. At 20° and 23° C. runners were produced at all light intensities, but numbers were much higher at 23° C. In December and January runner production at 23° C. decreased if light intensity was only increased once either during daylight or during application of supplementary light.—I.V.T. Wageningen. [For part I see *H.A.*, 25: 2531.]

1482. Ward, K. M.
Mulching the strawberry crop.
Qd agric. J., 1955, **81**: 203-5, illus.
The advantages of mulching are described. The materials which may be used are tanbark, *Casuarina* leaves, blady grass, peanut and sunflower hulls, and other seed refuse.

Vines.

(*See also* 1294, 1296, 1353, 1376, 1377, 1455, 1510a-e, g-j, n, p, q.)

1483. Breviglieri, N.
La viticoltura negli Stati Uniti con particolare riguardo alla California. **(Viticulture in the United States with special reference to California.)**
Atti Accad. ital. Vite, **1954**, 1955, **6**: 260-328, bibl. 1, illus.
Probably the fullest account available, not excluding American bulletins in English. A most comprehensive treatise.

1484. Dalmasso, G.
La viticoltura italiana nel quadro della situazione della viticoltura mondiale. **(Italian viticulture in relation to the world viticultural situation.)**
Atti Accad. ital. Vite, **1954**, 1955, **6**: 19-42, bibl. 6.

In the light of world overproduction of wine recommendations are made for limiting Italian planting.

1485. DE MARNEFFE, R., AND DELHAYE, R.
Rapport No. 8. Résumé des essais pratiqués. 1954–1955. **(Report No. 8. Summary of field tests. 1954-1955.)**
[*Publ.*] *Stat. prov. Rech. sci. vitic. La Hulpe*, 1955, pp. 21, illus.
A brief summary is given of tests carried out in 1954 and 1955 on hybridization, growth stimulants and supplementary light, *Armillariella mellea*, pot experiments with various composts, grape storage, and variety tests.

1486. VIDAL, J. P.
Les raisins de table précoces et de saison au Maroc. **(The early and midseason dessert grapes of Morocco.)**
Terre maroc., 1955, **29**: 389-92, 440-51, illus.
Notes are given on the morphological and agronomic characters of 10 recommended varieties. Brief cultural advice is also given.

1487. NASTEV, D.
Notes on vine varieties in Macedonia. [Yugoslav, with French summary.]
Annuaire Fac. Agric. Sylvic., Skopje, 1951/52, 1954, **5**: 263-300, bibl. 3, illus.
Since the occurrence of phylloxera the older vine varieties have been cultivated less, and several have been replaced by higher-yielding varieties. Red wine varieties are most commonly grown and they are not of high quality. Almost all varieties except Prokupatz and Plovdina may be grown on poor dry soils.

1488. NASTEV, D.
Study of fertilisation in some native and foreign vine varieties. [Yugoslav, with French summary.]
Annuaire Fac. Agric. Sylvic., Skopje, 1953/54, 1955, **7**: 263-74, bibl. 4, illus.
A study of 25 important vine varieties has shown that 2 groups may be identified. One group is hermaphrodite with pollen capable of germination, and the second group has functional flowers but the pollen does not germinate.

1489. BROCK, R. B.
Progress with vines in 1955.
Comm. Gr, 1956, No. 3132, pp. 39-41, illus.
As the result of work at Oxted in Surrey the following dessert varieties are recommended for growing unprotected in favourable sites in the open: Muscat de Saumur, Pearl of Czaba, Pirovano 14, Noir Hatif de Marseille, Precoce de Malingre, Madeleine Royale and Oliver Irsay. Research is now concentrated on grapes for wine and brandy production, and the best wine varieties are considered to be Gamay Hatif des Vosges, Riesling Sylvaner, Precoce de Malingre, Madeleine× Sylvaner and 28/51.

1490. MÄRKER, H.
Überlegungen zur Grösse der Teilstücke im weinbaulichen Feldversuch. **(Thoughts on plot size in field trials with vines.)**
Züchter, 1956, **26**: 53-60, bibl. 7.
In a discussion of the factors affecting plot size the author emphasizes that plots must be "as small as possible and as large as necessary". Methods of equalizing soil effects and of estimating individual variations are proposed. It is not possible to specify an optimal plot size suitable for all purposes; plots of 6 plants or fewer are not considered desirable. In field trials concerned with quality of wine plot size should only be increased after all treatments have been adequately replicated.—Inst. Weinb. Kellerwirtsch., Geisenheim/Rhein.

1491. WURGLER, W., LEYVRAZ, H., AND BOLAY, A.
Peut-on prévoir le rendement de la vigne avant le débourrement? **(It is possible to foretell grape yield before bud burst?)**
[German, English and Italian summaries.]
Landw. Jb. Schweiz, 1955, **4**(n.s.): 783-6, bibl. 2, illus.
Young vine shoots about 20 cm. long were selected and the 2 basal buds forced into growth during the latter part of the dormant season. The clusters which emerged from the buds were counted and classified according to size. The average yield of grapes from different-sized clusters has been estimated from several years' observations, and these figures were used in the estimation of the subsequent year's crop. Such an estimate cannot allow, of course, for losses caused by disease or bad weather.

1492. HUGLIN, P.
Sur la fertilité des yeux des gourmands de quelques cépages de *Vitis vinifera* L. **(On the fertility of buds on suckers on some varieties of *Vitis vinifera*.)**
C.R. Acad. Agric. Fr., 1955, **41**: 709-11, bibl. 10.
In tests in 1952/53 and 1954/55 on 9 varieties commonly grown in Alsace the buds on suckers from old wood and on normal shoots arising from 2-year-old wood were equally fertile. Workers in some other localities have in some cases found sucker buds to be sterile.

1493. CRESCIMANNO, F. G.
Risultati di 2 anni di prove sulla stimolazione rizogena in talee di vitigni portinnesti. **(The results of 2 years' experiments on root growth promotion in vine rootstock cuttings.)**
Nuovo G. bot. Ital., 1954, Vol. **61**, Nos. 2-3, from abstr. in *Riv. Ortoflorofruttic. ital.*, 1955, **39**: 482.
Vitamin B_1 in distilled water increased rooting considerably, and distilled water alone also had a positive effect, but Seradix 1, 2 and 3 had no effect.

1494. DOTTI, F.
La causa della mancanza di affinità fra Barbera e 57 Richter. **(The cause of the incompatibility of Barbera with 57 Richter.)**
Atti Accad. ital. Vite, 1954, 1955, **6**: 95-109, bibl. 4, illus.
Anatomical studies showed that the root failure which quickly follows the direct grafting or double working of Barbera on 57 Richter is due to the inability of the stock to produce normal conducting tissue owing to the effect of the leaves of the scion.

1495. Malan, A. H.
Fruiting and growth habits of Waltham Cross grapes.
Fmg S. Afr., 1955, **30**: 409-10, 416, bibl. 1, illus.

Canes of Waltham Cross vines were pruned to several lengths, and then all but the 3 terminal buds were removed. Sprouting from buds at the lower (basal) nodes tended to be poorer than from those at higher nodes, and in general subsequent growth was less. Buds at nodes 4–6 from the base produced 76·5% more bunches than those at nodes 1–3, while those on nodes 7–9 produced 150% more bunches. Grape quality, based on bunch weight and percentage of undergrade berries, was considerably inferior at the lower nodes. No consistent differences were found in percentages of seedless berries.—West. Prov. Fruit Res. Stat., Stellenbosch.

1496. Malan, A. H.
The topping and removal of lateral shoots and shortening of flower clusters in Alphonse Lavallée grapes.
Decid. Fruit Gr, 1955, **5**: 252-4, illus.

Pruning trials were made at Bien Donne experimental farm, Groot Drakenstein, on Alphonse Lavallée vines of which the bunch nearest the base of the shoot had been removed prior to flowering. Recommendations range from shortening the clusters after the flowering stage in vines normally producing very compact bunches to one of two intensive treatments at flowering time in vines normally producing very loose bunches, namely, (a) severe topping of all long shoots, and tipping of short shoots, removal of all lateral shoots, with shortening of flower clusters, or (b) severe topping of all long shoots and tipping of short shoots, with shortening of flower clusters, all new growth being once more tipped off after approximately 7–10 days.—W. Prov. Fruit Res. Stat., Stellenbosch.

1497. Antcliff, A. J., Webster, W. J., and May, P.
Studies on the sultana vine. III. Pruning experiments with constant number of buds per vine, number and length of cane varied inversely.
Aust. J. agric. Res., 1955, **6**: 823-32, bibl. 2.

Pruning experiments are described in which the number of buds per vine was kept constant, and the number and length of canes were varied inversely. The position of the pruning cut affected bud burst at only the two terminal bud positions and did not affect the number of fruitful shoots at any bud position. For any length of cane likely to be used in practice, bud burst in the most fruitful region would not be affected. For a constant pruning level there were no significant differences in yield when length of cane was varied from 11 to 18 buds, but in years of high fruitfulness yield was significantly depressed when the canes were 25 buds long. Apical dominance could also be shown on vines with canes of variable length, and it was shown that the inhibiting agent did not move transversely. [From authors' summary.]—Commonw. Res. Stat., Merbein. [See also *H.A.*, 26: 294, 295.]

1498. Treccani, C. P.
Influenza dell'intensità di potatura sulla produttività e sullo sviluppo della vite nelle colline dell'Oltrepo pavese. **(Effect of intensity of pruning on yield and development of vines in the hills of Pavia beyond the Po.)**
Atti Accad. ital. Vite, 1954, 1955, **6**: 111-25, bibl. 2.

In investigations in 1949/53 on Moscato di Canelli on 34E: (1) trellis-trained vines yielded 47–70% more than Guyot-trained vines (in which pruning is more severe) when left unthinned, and 86–134% more when the bunches were thinned; (2) 35% bunch thinning generally increased production in trellis-trained vines and decreased it in Guyot-trained vines; (3) must density was higher in grapes from Guyot-trained vines especially in the first year, and was increased in both systems by bunch thinning; (4) trellis-trained vines showed better development than Guyot-trained vines, the wood increments in wood growth being 87–97% and 64–67% respectively with complete removal of bunches and 57–69% and 42–59% respectively without removal.

1499. Jones, L. T.
Hormone sprays and their effects on the setting, yield and vigour of currant grape vines.
J. Agric. W. Aust., 1955, **4**: 561-83, bibl. 10, illus.

Trials in the Swan Valley have shown that PCPA at 20 p.p.m. will set currants as effectively as cincturing under a wide range of conditions, without affecting yield or quality. 2,4-D was erratic in its effect and cannot be recommended. Hormone-treated vines showed improved vigour over cinctured vines. Cincturing caused rapid deterioration of weak vines, especially those showing moisture stress.

1500. Lecat, P.
Première esquisse de la physiologie du potassium en pulvérisation foliaire sur la vigne, au moyen du potassium radioactif. **(Preliminary investigations with radioactive potassium on the physiology of potassium leaf nutrition of the vine.)**
C.R. Acad. Agric. Fr., 1955, **41**: 712-13, bibl. 2.

The results of tests with potassium nitrate and potassium carbonate incorporating K^{42} were: (1) The amount of K held on the leaves immediately after spraying varied greatly despite careful wetting of both surfaces, ranging from approximately 50 to 150 mg. per young vine bearing 50 leaves. (2) Penetration into the leaf was evident the day after spraying, reached approximately 50% 2–3 days after spraying and was complete after 5 days, the rate being slightly greater in old than in young leaves. (3) Transport from the leaf, expressed as a percentage of the amount applied, was 4% after 3 days, 16% after 5 and 32% after 6. (4) Two days after spraying very considerable activity was observed in the young leaves, young tendrils and grapes. In the grape activity was not proportional to weight and there are probably critical phases of development requiring different amounts of K, the largest amounts being required at about maturity. The amount of K^{42} transported to the fruit doubles or trebles between the 2nd and 3rd day after spraying.

1501. Beattie, J. M.
Mulch as a management system for grapes.
Res. Circ. Ohio agric. Exp. Stat. **28**, 1955, pp. 14, bibl. 9, illus.

Concord grapes were grown for 9 years under permanent straw mulch or cultivation plus cover crop with different rates of N. Vigour as evidenced by pruning weights in 1952 and 1953 was significantly higher under mulch. Mulched vines produced 16·9 lb. of fruit per vine per year as compared with 11·4 lb. from the cultivated vines. The petiole concentrations of N, P, K and Mn were higher, while those of Ca and Mg were lower, under mulch. Highest total yields under cultivation occurred when 80 lb. per acre of actual N was applied each year. With mulch the highest total yield for the period 1947–52 occurred when 40 lb. actual N per acre per year was applied, but in 1953 the highest yields occurred when no nitrogen was applied and this continued to be the case in 1954 and 1955. Mulch resulted in the production of fruit containing lower soluble solids and higher acids contents than did cultivation. The influence of season on these constituents was nearly as great as was that of the soil management system. The reduction in soluble solids under mulch is believed to be the result of delayed maturity and might be overcome by permitting a longer ripening period. During the first few years, while a mulch is being established, applications of 40 lb. of actual N per acre per year are recommended. The use of a permanent mulch system of management for Concord grapes is believed to be economically sound and to possess certain advantages not obtainable under the conventional cultivation plus cover crop soil management system. [From author's summary.]

1502. Hall, E. G.
Use of sulphur dioxide in storing and shipping grapes.
Food Pres. Quart., 1955, **15**: 42-4, bibl. 11.

Research in Australia, South Africa and America is reviewed. Previously unpublished data from Australia have shown that N and K metabisulphites or bisulphites (releasing SO_2) have been used successfully in powder, solution or pellet form when incorporated with packing materials. In further experiments the most promising results were obtained with SO_2-releasing chemicals in the wood-wool of a wood-wool tissue-paper pack, and with I_2 in granulated cork. By placing a tablet containing 15% sodium bisulphite, 4% spermaceti wax and 81% alum in each bunch of grapes, wastage was effectively reduced. Further tests showed that the addition of up to 20 g. powdered potassium metabisulphite per case of 32 lb. fruit mixed with 4½ lb. of cork packing reduced wastage and prolonged storage life. Some reports of tainting and injury from the use of these materials have been received, and 10 g. of bisulphite per box should normally be adequate. Specially prepared sawdust has been shown to be an effective substitute for granulated cork as a packing material. Small-scale shipments of grapes, fumigated with SO_2 gas, wrapped in small cellophane bags and packed with shredded cellophane, were successfully exported from Australia to Singapore. [See also *H.A.*, 25: 3673g.]

1503. Gac, A.
Influence de l'humidité relative et de la vitesse de circulation de l'air sur la conservation du raisin Muscat de Hambourg, en frigorifique. **(Effect of relative humidity and rate of air circulation on the cold storage qualities of Muscat de Hamburgh grapes.)**
Rev. gén. Froid, 1954, **31**: 729-33, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2792.

Muscat de Hamburgh grapes were successfully stored in air of normal composition at 0° C. and a relative humidity of 80% for up to 28 days. Losses in weight at 28 days ranged from 1·7% at 98% relative humidity to 5·7% at 65% relative humidity, with a rate of air circulation of 9 l. per minute, and from 3·2% at 80% relative humidity to 5·6% at 65% relative humidity with a rate of air circulation of 4 l. per minute. The percentage of grapes showing spoilage was highest at 98% relative humidity and lowest at 80% and, at comparable levels of relative humidity, was higher with the higher rate of air circulation.

1504. de Fábregues y Soler, J. M., Estalella Ayxela, T., and García Barceló, J.
Contribución al estudio del aprovechamiento de los sarmientos de vid y orujos de uva. **(Contribution to the study of the utilization of vine shoots and winepress waste.)**
Bol. Inst. Invest. agron. Madrid, 1955, **15**: 531-81, bibl. 31.

The results are given of analyses and experiments on vine shoots and press waste. It is concluded that sufficient quantities of these materials are available for the commercial production from them at selected centres of waxes, resins, furfural, glucose, sugars and briquettes.—Estac. Vitic. Enol. Villafranca del Panadés.

Nuts.

(*See also* 1393, 1510r, 1577, 1679, 1954r, 2148n, 2317.)

1505. Schad, C., Grente, J., and Solignat, G.
Recherches d'arboriculture fruitière de la Station d'Amélioration des Plantes de Clermont Ferrand. IV. Amélioration du châtaignier. Compte rendu des travaux effectués en 1953. **(Research on fruit tree growing at the Station d'Amélioration des Plantes at Clermont Ferrand. IV. Chestnut improvement. Investigations in 1953.)**
Ann. Amél. Plantes, 1955, **5**: 302-24, bibl. 5, illus.

Research included studies on stigmatic receptivity, controlled pollination, self-pollination, crossing, open pollination, marcotting, and resistance to ink disease (*Phytophthora cambivora* and *P. cinnamomi*), to bark canker (*Endothia parasitica*), to drought and to winter and spring frosts.

1506. Cerbulis, J.
Carbohydrates in hazel (*Corylus* sp.). I. Major sugar component in Turkish hazelnut kernel.
J. Amer. chem. Soc., 1955, **77**: 6054-6, bibl. 19.

The major components were: D-fructose, D-glucose, sucrose, raffinose and stachyose. At least 14 minor sugar components were detected; most of them were ketose-containing.—S. F. Whitman and Son, Inc., Philadelphia.

1507. Sharpe, R. H., and Blackmon, G. H.
Effect of growth regulators on production and quality of certain nut and fruit plants.
A.R. Fla agric. Exp. Stats, 1954, p. 105.
Sprays of 2,4,5-T at 20 p.p.m. successfully thinned the pecan varieties Randall, Curtis, Success and Money-maker. The Stuart and Kennedy varieties needed up to 100 p.p.m. for heavy thinning. Oil emulsion at 3% was effective in breaking dormancy of several plum varieties.

1508. Evréinoff, V. A.
Le pistachier (Étude pomologique). (**The pistachio tree: a pomological study.**)
J. Agric. trop. Bot. appl., 1955, **2**: 387-415, bibl. 9.
The subjects covered are distribution, morphology, origin, biology, ecology, flowering, yield, propagation (by sowing, by grafting including methods and root-stocks, by coppice shoots, by root suckers and by air-layering), varieties, culture, pests and diseases.

1509. Anon.
Walnut cultivation in Poland.
World Crops, 1956, **8**: 25.*
Success has been obtained in experiments on grafting walnuts under glass made by Professor Pieniazek at the Skierniewici Institute with a view to stimulating commercial walnut growing in Poland. Good local clonal material exists. A method has been developed of preparing walnut syrup. This is twice as rich in vitamin C as orange juice.

Noted.

1510.

a Baldacci, E., and Fogliani, G.
Aspetti della viticoltura nell'Oltrepo pavese. (**Aspects of viticulture in districts of Pavia beyond the Po.**)
Atti Accad. ital. Vite, 1954, 1955, **6**: 63-78, bibl. 8.
Reconstruction and diseases.

b Berlati, M.
La produzione vitivinicola dell'Oltrepo. (**Production of grapes and wine in districts of Pavia beyond the Po.**)
Atti Accad. ital. Vite, 1954, 1955, **6**: 79-92, bibl. 4.

c Bisson, J.
Étude ampélographique des populations de Chasselas du Tarn-et-Garonne. (**Ampelographical study of the Chasselas populations of Tarn-et-Garonne.**)
Progr. agric. vitic., 1956, **145**: 85-95, bibl. 10, illus.
Eight types are differentiated.

d Branas, J., and Truel, P.
Possibilités de la mécanographie dans l'identification des cépages. (**Possibilities of a card index system for use in the identification of varieties.**)
C.R. Acad. Agric. Fr., 1955, **41**: 682-4.

e Bruni, B.
Montepulciano. (**Montepulciano.**) [English summary 10 lines.]
Ann. Sper. agrar., 1956, Vol. 10, No. 1, Suppl. pp. LXXXV-XCV, bibl. 15, illus.
A red wine vine variety.

f (Christ, E. G.)
New strawberry named Jerseybelle.
N.J. Agric., 1955, **37**(5): 10, illus.

g Christ, E. G.
More than 300 varieties in grape research plots.
N.J. Agric., 1955, **37**(4): 13-15, bibl. 2, illus.
European, American and hybrid at N.J. agric. Exp. Stat., Rutgers.

h Cosmo, I., Comuzzi, A., and Rubin, V.
Indagini sulla ricostituzione viticola della Venezie ai fini dell'orientamento per i futuri impianti. . . . Provincia di Padova, primo contributo. (**Studies on vineyard reconstruction in Venetia with a view to future planting. Province of Padua, 1st contribution. Zone of the Euganei Hills: soils commonly inducing chlorosis.**) [English summary 10 lines.]
Ann. Sper. agrar., 1956, **10**: 289-320, bibl. 8, illus.
Cosmo, I.
Indagini sulla ricostituzione viticola dei colli Euganei. (**Vineyard reconstruction in the Euganei Hills.**)
Agric. Venez., 1955, **9**: 663-80, bibl. 13, illus.

i Cosmo, I., and Polsinelli, M.
Pinella. (**Pinella.**) [English summary 11 lines.]
Ann. Sper. agrar., 1956, Vol. 10, No. 1, Suppl. pp. XXIX-XL, bibl. 11, illus.
A white wine vine of Padua.

j di Crecchio, R.
Aspetti tecnici-economici della coltivazione del Pergolone nella provincia di Chieti. (**Technical and economic aspects of the cultivation of the Pergolone vine in the province of Chieti.**)
Atti Accad. ital. Vite, 1954, 1955, **6**: 411-24, illus.
A white tough skinned table grape variety for export. [See also *H.A.*, **25**: 240.]

k Eaton, E. L.
Blueberry production in the Atlantic Provinces.
Agric. Inst. Rev., 1956, **11**(1): 14-15, 48, bibl. 4, illus.
Species, varieties, management and research.

* From an article by Professor Pieniazek in *Problemy*, Warsaw, September 1955.

l HUANG, H. T.
Enzymatic identification of the anthocyanin pigment of blackberry.
Nature, 1956, **177**: 39, bibl. 6.
The anthocyanin from blackberry is a cyanidin-3-monoglucoside.—Rohm and Haas Co., Philadelphia, Pa.

m NERI, M.
La coltivazione del fragolone Madame Moutot nell'Imolese. **(The culture of Madame Moutot strawberries in the Imola district.)**
Riv. Ortoflorofruttic. ital., 1955, **39**: 467-9, illus.
In irrigated vegetable gardens, as a field crop and in orchards.

n PEYER, E.
Der Rebschnitt in Bildern. **(Vine-pruning in pictures.)**
Schweiz. Z. Obst- u. Weinb., 1956, **65**: 59-64, illus.

o SHARPE, R. H., AND DICKEY, R. D.
Erect and trailing blackberries in Florida.
Circ. Fla agric. Exp. Stat. **S-67**, 1954, pp. 8, bibl. 3, illus.

p STASUNAS, V. J.
The anthocyan pigments of Zinfandel [*Vitis vinifera*] grapes and wine.
Diss. Abstr., 1955, **15**: 1316-17, bibl. 4, being *Publ.* 12737 of 151 pp.

q STOVER, L. H.
The Lake Emerald grape.
Circ. Fla agric. Exp. Stat. **S-68**, 1954, pp. 12, illus.
A new garden vine grape containing *V. vinifera*, *V. simpsoni* and *V. labrusca* blood.

r TRICAUD, P.
La culture du noyer dans le centre-ouest. **(Walnut growing in the mid-west of France.)**
Rev. hort. Paris, 1956, **128**: 1388-90, illus.
Varieties, culture and harvesting.

s WALLACE, J. G.
Deep straw culture helps black currants.
Grower, 1956, **45**: 47-8.
Cultural recommendations for Scotland.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 1641, 1650-1653, 2330.)

1511. BÄRNER, J.
Bibliographie der Pflanzenschutzliteratur. 1951. **(Bibliography of plant protection. 1951)**, Berlin, 1955, pp. 420.
A publication of, and obtainable from, the Biologischer Bundesanstalt für Land- und Forstwirtschaft in Berlin-Dahlem, containing 12,500 references classified according to type of plant.

1512. BIOLOGISCHE BUNDESANSTALT FÜR LAND- UND FORSTWIRTSCHAFT, BRAUNSCHWEIG.
Jahresberichte der Pflanzenschutzämter 1954. **(Annual Reports of the Plant Protection Services 1954 of the Biological Institute for Agriculture and Forestry, Braunschweig)**, 1955, pp. 168, bibls.
Each regional division of the Plant Protection Service reports on administration, important pests and diseases, special control projects, research, examination of imports and exports and publications.

1513. CANADA, MINISTER OF AGRICULTURE.
Tree fruits.
A.R. Canada Minist. Agric. 1954/55, 1955, pp. 32-7.
Apple scab: captan gave excellent control in Nova Scotia and Quebec. *Fire blight on pear:* bloom applications of Agri-strep (40 p.p.m.) reduced numbers of spur and twig infections. *Virus diseases:* little cherry present in B.C. is distinct from western X little cherry; sprays of protective insecticides have markedly reduced spread of little cherry. *Orchard mites:* in Ontario ovotran, PCPBS and Elimite, which are relatively ineffective against adults of 2-spotted and European mites, were highly toxic to immature stages, and had a long residual action. *Eye-spotted bud moth:* in Ontario malathion was very effective against overwintering larvae at temperatures of 60° F. or higher, but was relatively ineffective below 50° F. *Green peach aphid:* in B.C. lindane or malathion gave good control when applied at the delayed dormant stage.

1514. CANADA, MINISTER OF AGRICULTURE.
Small fruits.
A.R. Canada Minist. Agric. 1954/55, 1955, pp. 37-8.
Strawberry diseases: widespread *Verticillium* wilt is reported from Vancouver Island and the Fraser Valley; identification of *Phytophthora fragariae* strains. *Strawberry insects:* increased injury by black vine weevils in B.C. has coincided with the introduction of sprinkler irrigation and sawdust mulching; high humidity increases female fecundity and egg hatching of this weevil; white grub numbers were still reduced in 1954 after contact insecticide dusting on plots in 1952. *Raspberry viruses:* black raspberry necrosis and raspberry yellow net have been identified at Vancouver; black raspberry necrosis was eliminated from Cuthbert plants by growing them for 10 days at 95–105° F. *Blueberry diseases:* 3 applications of a 10% ferbam dust gave considerable protection to native plants from blossom and twig blight.

Disturbances of nutrition or of unknown origin.

(*See also* 1346, 1348, 1640b, r, 1695.)

1515. BOLLARD, E. G.
Trace-element deficiencies of fruit crops in New Zealand.
Bull. D.S.I.R., N.Z. **115**, 1955, pp. 52, bibls. 26 + 25 + 7 + 7, illus.

A general account is given of the occurrence of trace-element deficiencies, and is followed by a description of their detection and methods of treatment. Three separate sections on boron, manganese and zinc follow, in which the specific disorders caused by deficiency of these elements are discussed and illustrated in more detail.

1516. Shibukawa, J., and others.
Studies on leaf analyses of apple trees. II. Deficiency symptoms. (1). [Japanese, with English summary 1 p.]
Misc. Publ. Aomori Apple Exp. Stat. **7**, 1955, pp. 12, bibl. 5, illus.

A description with coloured illustrations is given of the leaf symptoms of deficiency in N, P, K, Ca and Mg in apple based on 2 years' study in sand culture. The leaf contents of the deficiency elements when symptoms appeared were 1·47–1·94% N, 0·10% P and 0·60–75% K in the Ralls variety and 0·20% N, 0·12–0·14% P, 0·70–0·80% K, 0·50% Ca and 0·19–0·25% Mg in Delicious.

1517. Craddock, F. W., and Cook, A. J.
Potash deficiency on the Murrumbidgee Irrigation Areas.
Agric. Gaz. N.S.W., 1955, **66**: 593-4.

Recent plant-tissue analyses indicate that there is some potash deficiency in horticultural crops grown under irrigation in the areas, and that where potash levels are low and sodium high the development and severity of sodium toxicity may be accentuated. Apple and pear leaf analyses are presented. It is recommended that K should always be applied when N and P are applied.

1518. Ciferri, R., and others.
Interventi con palo iniettore in pescheti leptonecrosati. **(Injection-lance treatment in leptonecrotic peach orchards.)**
Not. Mal. Piante, 1955, No. 33, pp. 41-7, bibl. 1.

An account is given of experiments in Gorizia in 1952/54 in 4 young peach orchards in which the trees, despite surface fertilization either on first planting or annually, began to develop leptonecrosis due to P and K deficiency a few years after planting. The following fertilizer treatments were given separately or together: (1) A single surface application of farmyard manure plus complete fertilizer at a rate depending on the age of the tree; (2) One application per year for 1–3 years of a solution of 10–15% bi-ammonium phosphate and potassium sulphate given by injector-lance at 15–20 cm. depth at 20 l. per tree in 7–9 positions in concentric circles. The 2 lances used were driven by a motor pump mounted on a tanker and the operation took about the same time as a round of insecticidal spraying. The results were: (1) It was confirmed that the disorder, at least in its slow chronic form, can be controlled by surface applications of farmyard manure plus complete fertilizer. (2) Injection treatment can cure trees which could not otherwise be saved. (3) The best time for injection when applied instead of ordinary fertilizer is at flowering. (4) Injection treatment applied in August cured or improved to a greater or less extent 60 out of 69 trees which either newly manifested the disorder, still showed severe decline despite surface manuring at the spring flush or suffered from the mild form but had not benefited from earlier manuring. (5) In one orchard yields, which had fallen to 21 kg. per tree in 1951, rose from 28 kg. after treatment began in 1952 to 48 kg. in 1954. [See also *H.A.*, 25: 1432 and 25: 2591.]

1519. Gruppe, W.
Vergleichende Blatt- und Bodenuntersuchungen in Apfelplantagen und -baumschulen unter besonderer Berücksichtigung von Kalium und Magnesium. III. Das Auftreten von Kalium- und Magnesiummangel bei Apfelbäumen in Nordwest-Deutschland (Erhebungsuntersuchungen). **(Comparative leaf and soil analyses in apple orchards and nurseries, with special reference to potassium and magnesium. III. The occurrence of potassium and magnesium deficiencies in Northwest Germany.)**
Gartenbauwiss., 1955, **2**: 3-29, bibl. 11.

During 1952 and 1953 data from leaf and soil tests were collected, and Mg and K contents were related to the occurrence of Mg and K deficiency symptoms. In leaf tests a highly significant negative correlation was found between K and Mg contents. The sum of K and Mg was not significantly different in healthy and deficient leaves. Deficiency of K appeared more often on heavier soils, and then especially at a relatively low degree of K saturation. Trees with Mg deficiency were found when the available Mg in the soil was less than 5 mg. MgO/100 g. soil. Magnesium deficiency occurred at high K_2O/MgO ratios in the soil. Deficiency symptoms were apparent on sandy soils with a K_2O/MgO ratio below 1 : 3, when there were low leaf contents of CaO. At low pH values there was an increase in Mg deficiency incidence.—Inst. Obstb., Techn. Hochsch., Hannover. [For earlier work see *H.A.*, 25: 2464 and 3578.]

1520. Kenworthy, A. L., Bell, H. K., and Larsen, R. P.
Zinc deficiency found in Michigan peach orchard.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **38**: 70-2, illus.

Zinc deficiency has been found in a peach orchard planted on an old asparagus field. Leaf analysis showed that 12·7 p.p.m. Zn were present in markedly deficient leaves, while in shoots showing partial recovery 25·7 p.p.m. were present. Zinc-deficient leaves contained an excess of potassium.

1521. Schander, H.
Beiträge zur Frage der Bodenmüdigkeit bei Obstgehölzen. I. **(Contributions to the problem of soil sickness with fruit trees. I.)**
Gartenbauwiss., 1955, **2**: 115-40, bibl. 28, illus.

Experiments on soil sickness have been carried out with transplanted and seedling fruit trees for several years, chiefly on a light soil but also in pot experiments and on a heavier soil. Soil sterilization, or treatment with CS_2 or copper slag before planting bush apples on M.IV reduced, but did not control, soil sickness. No reduction was obtained with young established trees.

Trees in soil-sick plots were stunted, but grew quickly when transferred to healthy soil. Replanted trees on seedling rootstocks showing symptoms of soil sickness did not respond to soil applications of Cu or B; soil treatment with CS_2 reduced the effects of soil sickness. Single-worked trees were less susceptible to soil-sickness than were double-worked trees. In pot experiments with Grahams Jubiläums-Apfel, seedling germination and development were not affected by soil sickness. Dilution of the affected soil with sand reduced later symptoms. Soil-sickness in seed beds did not affect germination and early seedling growth of apples, but growth in length and thickness of the shoot was later inhibited. The application of a complete mineral fertilizer to the light soil did not promote shoot growth of apple seedlings, and root growth was restricted. Increased soil moisture did not affect soil sickness. Seedling variability in height and diameter was reduced with increasing severity of soil sickness. In soils which induced soil-sickness symptoms in apple seedlings pear seedlings were less markedly affected, while seedlings of quince and *Chaenomeles* grew normally. Successive crops of apple seedlings were grown on a series of experimental plots to build up soil-sickness and obtain a range of soil-sickness intensity in the soil. In a plot which had grown fruit seedlings for 2 successive years, a year's rest during a potato crop did not appear to reduce the severity of soil-sickness symptoms occurring in the following crop of apple seedlings. Climatic factors can sometimes affect the severity of symptom expression. A symptom of severe soil-sickness was the negative response of the plants to manuring. Uneven growth in the seed-bed indicated the presence of soil sickness.—Inst. Obstb., Techn. Hochsch., Hannover.

1522. Koch, L. W.
The peach replant problem in Ontario. I. Symptomatology and distribution.
Canad. J. Bot., 1955, **33**: 450-60, bibl. 34.

In Ontario serious difficulties are frequently encountered in the establishment of young peach trees as replacements in old orchard sites. Symptoms vary from slight stunting to complete absence of growth. In this introduction to a series of papers dealing with the various phases of a co-ordinated investigation now under way, the author reviews the literature and describes the symptoms and effects of the disorder.—Sci. Serv. Lab., Harrow, Ontario.

1523. Patrick, Z. A.
The peach replant problem in Ontario. II. Toxic substances from microbial decomposition products of peach root residues.
Canad. J. Bot., 1955, **33**: 461-86, bibl. 15, illus.

Experiments were carried out to evaluate the importance of soil toxins in the peach replant problem, and to determine whether the substances produced by the interaction of microorganisms occurring in old peach orchard soils and peach root residues were toxic to living peach roots. A rapid and accurate indication as to whether or not these substances were toxic was obtained by determining their effect on the respiration of excised peach root tips. It was demonstrated that substances which inhibit the respiration of excised peach root tips are produced when peach root residues, and also chemically pure amygdalin, are acted on by certain microorganisms occurring in old peach orchard soils. Such substances were not produced when the soils were autoclaved before amygdalin was added or when other soils were used in which no breakdown of amygdalin had occurred. Again no such inhibiting substances were produced when other root residues, such as sour cherry, tobacco or pepper roots, were added to these soils in place of peach root residues or amygdalin. The inhibiting substances were readily obtained by extraction with water and they proved to be highly active physiologic agents; the inhibiting effect on the respiration of peach root tips, which ranged from 40 to 90%, could be detected after tips had been less than half an hour in the toxic leachates. In addition to inhibiting respiration these substances also induced darkening and finally the necrosis of meristematic cells. All these effects proved to be irreversible after tips had been five hours in the leachates. The root tips were apparently killed after this time. Parallel experiments were carried out also with pure amygdalin, and similar inhibition of respiration and injurious effects on meristematic cells were obtained with microbial degradation products of either amygdalin or peach root residues. Water solutions of amygdalin, emulsin, amygdalin and emulsin combined, and various benzaldehyde dilutions were also tested. Inhibition of respiration and darkening of apical meristems were only obtained, however, in solutions where amygdalin was hydrolyzed by emulsin and in the various concentrations of benzaldehyde in water. They were not obtained in the separate solutions of either the glycoside or the enzyme. It was concluded, therefore, that microbial action on the amygdalin fraction of peach roots is mainly responsible for the toxic factor frequently encountered in old peach orchard soils. [Author's abstract.]—Sci. Serv. Lab., Harrow, Ontario.

1524. Schad, C., Grente, J., and Arnaud, R.
Recherches d'arboriculture fruitière de la Station d'Amélioration des Plantes de Clermont Ferrand. II. Le dépérissement de l'abricotier. Compte rendu des travaux effectués de 1951 à 1953. **(Research on fruit tree growing at the Station d'Amélioration des Plantes at Clermont Ferrand. II. Apricot decline. Report on research conducted between 1951 and 1953.)**
Ann. Amél. Plantes, 1955, **5**: 271-85, bibl. 1, illus.

The major symptom, progressive dieback leading to death in 4–5 years or less, is accompanied by discoloration, leatheriness, rigidity, malformation and curling of the leaves and browning and off-flavour in the fruit. Investigation led to the differentiation of declines due to infections of the roots and the aerial portions and to physiological causes. Control includes the use of resistant clones and soil disinfection with organo-mercury products.

1525. Hough, L., and Pridham, J. B.
The metabolism of D-glucuronic acid in plum tissue and its relation to gummosis.
Arch. Biochem. Biophys., 1955, **59**: 17-23, bibl. 16.

Experiments on Victoria plum trees suggest that the

appearance of glucuronic acid in the mesocarp is directly related to the formation of gum.—Biol. Chem. Labs, Univ. Bristol.

Climatic factors.

(*See also* 1298-1300, 1431, 1576, 1640f.)

1526. VAN DER LINDE, R. J.
Het onderzoek inzake de beschutting in de fruitteelt. (**Research on shelter for fruit-growing.**) [English summary ½ p.]
Jversl. Proefstat. Fruit., Volle Grond, Wilhelminadorp, 1954, 1955, pp. 59-62.

During 1952–54 the effect of shelters on growth and production of Jonathan and Golden Delicious was studied. Yield figures were too variable for any conclusions to be drawn, but it was noticed that the highest trees were found where there was shelter from the west wind. A single row of Lombardy poplars, about 14 m. high, gave protection for about 280 m. behind it. An alder windscreen, which was lower, did not give equal shelter. Strawberries sheltered with an artificial wooden screen ripened earlier and yields were increased.

1527. V.D. LINDE, R. J.
Windschermen in Zeeuwse fruitteelt. (**Wind shelters for fruitgrowing in Zeeland.**)
Fruitteelt, 1955, **45**: 1121-5, illus.

In exposed coastal areas the prevalent west wind reduces tree growth, and even protection from the south and south-east has advantages. The sheltered area is largest behind a hedge of only medium thickness if the crop is not too high in relation to the shelter. The average yields from a plot of Jonathan between 2 alder hedges, 130 m. apart and running North–South, were clearly higher in the western than in the eastern half. Openings in an outer hedge should be avoided, and should be as snall as possible in an inner hedge. Successive shelters should be planted at intervals of 15 times the height of the mature hedge, though 12 times may be more satisfactory in the coastal areas. Species recommended for hedge planting include alder, willow, poplar and elm.

1528. DAMARIO, E. A., AND PASCALE, A. J.
El calentamiento del aire en la lucha contra las heladas primaverales para la protección de los montes frutales en el valle del Rio Negro. (**Air heating for protection against spring frosts in orchards in the Rio Negro valley, Argentina.**) [English summary 11 lines.]
Meteoros, 1955, **5**: 185-206, bibl. 8, illus.

An account is given of experiments made at Villa Regina on still, clear nights of strong radiation in July/August 1955 on home-made and on American "lazy-flame" heaters. The conclusions were: (1) An increase of 3° C. is sufficient to protect apple and pear orchards in the Rio Negro valley from frost injury. (2) Such an increase can be obtained with 150 home-made heaters per ha. each burning 2·5 l. fuel oil per hour or with 100 lazy-flame heaters each burning 3–4 l. gas-oil per hour. (3) The average number of frosts a year during the critical period is 2·4. (4) The annual cost of heating per ha. is $2,500 and $3,000 with the homemade and the lazy-flame heaters respectively, and the initial costs are $7,500 and $13,500 per ha. respectively, but the difficulty of handling and the inefficiency of the homemade heaters offset their relative cheapness.

1529. ZWINTZSCHER, M.
Über Frostschäden an Obstunterlagen entstanden im Winter 1953/54. (Kurze Mitteilung). (**Frost damage to fruit rootstocks caused in winter 1953/54. (Short report.)**)
Gartenbauwiss., 1955, **2**: 30-9, bibl. 4, illus.

The effect of low winter temperatures on apple, quince, plum and F12/1 cherry rootstocks was studied. Roots and stems just above and below soil level were damaged, so that bark and cambium showed browning and adjacent tissues were killed. The greatest damage was caused by low temperatures at soil level, especially air temperatures, but soil temperatures of −10° C. were also damaging. M.I was shown to be the most frost-susceptible apple rootstock, only 17·5% survived in the propagating beds and considerable damage occurred on grafted trees. In the propagating beds 18·3% of M.IX survived, but no trees on M.IX were lost. Orchard trees on M.IV and M.XI were injured by frost. M.II was shown to be able to resist frost damage, and the resistance of M.XVI was confirmed. Northern Spy, M.X, M.XIV, possibly M.XV, and the Pillnitz clonal rootstocks R 6, R 7, R 9 and R 78 all showed some degree of frost resistance. M.VII plants in propagating beds were all killed. Plum rootstocks were almost all susceptible to frost except *Myrobalana alba* Pfalzer. F12/1 was not suitable for the climatic conditions of west Germany.—Max-Planck-Inst. Züchtungsforsch., Voldagsen.

1530. MODLIBOWSKA, I., AND ROGERS, W. S.
Freezing of plant tissues under the microscope.
J. exp. Bot., 1955, **6**: 384-91, bibl. 10, illus.

Stages in the freezing of cells of *Tradescantia* staminal hairs, of cherry and *Berberis* fruit skin, and of a moss leaf were observed and recorded by cinemicrography. Plant cells were killed not by low temperature, but by intracellular ice formation. Living, undamaged cells showed the strongest tendency to supercool, and this state was most commonly ended by ice inoculation. The cuticle, cell wall and ectoplasm form a barrier to cell inoculation, so that wounded cells freeze first, and then inoculate other cells through non-cutinized cell walls. Ice may form slowly from a few inoculating ice crystals or instantaneously from many centres of crystallization, the mode of development largely depending on the degree of supercooling. Ice usually forms first in the intercellular spaces and, although fatal in some cases, it may also have a protective effect.—E. Malling Res. Stat., Kent.

1531. TOORENAAR, G.
Een geslaagd experiment tegen verdroging. (**A successful experiment on reduction of injury from drought.**)
Fruitteelt, 1955, **45**: 1070-1, illus.

On soils of young sea polders in Zeeland drought

symptoms occur in fruit trees in certain years, especially where a thin clay layer overlies coarse sand. Irrigation is not possible because of the salt concentration of the water. Reversal of the soil layers by hand digging to a depth of 1 m. before planting improved the moisture holding capacity of the soil. Young apple trees on treated soils showed greater yields and better growth than those on untreated soils.—Proefstat. Fruit. Volle Grond, Wilhelminadorp.

1532. Hayashi, S.
Studies on the "yuzuhada" disease of fruits of Nijisseiki pear (*Pyrus serotina*). I. The relation of osmotic pressure in leaves and fruits to development of "yuzuhada".
[Japanese, with English summary ¾ p.]
J. hort. Ass. Japan, 1955, **24**: 94-102, bibl. 24.

Investigations were made on the cause of yuzuhada, a physiological disorder resulting in hard end or black end. The results and conclusions were: (1) The difference in osmotic pressure between the leaves and the fruit reached a maximum of approximately 6 atmospheres in the first half of July when the pressures in the leaves and the fruits were 16–17 and 10–11 atm. respectively. (2) In hot, dry weather a wide difference in pressure between the leaves and fruit persisted for a longer period each day in a diseased than in a healthy tree. (3) As the soil moisture content fell from near field capacity to near wilting point the moisture content of the leaves fell approximately 10% and their osmotic pressure rose by 5–6 atm.; the corresponding figures for fruit were a fall of 2·0–2·5% and a rise of 2·0–2·5 atm. The changes in moisture content and osmotic pressure in the fruit were not evident until (a) soil moisture fell to a point midway between field capacity and wilting point, and (b) the difference between the osmotic pressure in the leaves and fruit reached approximately 5 atm. (4) Water deficiency in the first half of July caused a high rate of yuzuhada after 20–25 days. (5) Little yuzuhada occurs in Nijisseiki grafted on *P. betulaefolia*, in which the leaf osmotic pressure is always higher than that in the Nijisseiki pear and in the *P. serotina* rootstock variety. (6) Under conditions of abundant soil moisture and poor transpiration there was no difference between the leaf osmotic pressure of Nijisseiki on *P. betulaefolia* and of Nijisseiki on *P. serotina*, but under dry atmospheric conditions that of the latter was much higher.

1533. Plock, H.
Über das Marillensterben. **(Apricot die-back.)** [German, English, French and Spanish summaries 4–5 lines each.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 279-82, illus.

The author discusses 4 possible causes of apricot death. Very slow die-back is caused by injuries to branches and trunks. Frost damage can also start die-back. Sudden death may often be caused by unfavourable weather conditions, too vigorous rootstocks, or a serious *Monilia* attack. In old apricot-growing areas soil sickness may cause tree death. The phenomenon of trunk twisting in older trees is possibly due to uneven development of the crown and the direction of the prevailing wind.

1534. Zimmerman, P. W.
Chemicals involved in air pollution and their effects upon vegetation.
Prof. Pap. Boyce Thompson Inst., 1955, **2**: 124-45, bibl. 33, illus.*

The chemicals discussed are sulphur dioxide, hydrofluoric acid gas, chlorine, hydrogen sulphide, ammonia, mercury vapour, ethylene, carbon monoxide and vapours of 2,4-D and other hormone-like substances. Subjects dealt with include symptoms, susceptibility in relation to environmental factors and the susceptibility of a range of species.

1535. Mader, P. P., Cann, G., and Palmer, L.
Effects of polluted atmospheres on organic acid composition in plant tissues.
Plant Physiol., 1955, **30**: 318-23, bibl. 9.

Chromatographic analyses of spinach leaves, damaged by natural smog and by the oxidation products of ozone and 1-hexene, petrol vapour and car exhaust, indicated that as a result of the fumigation a consistent and very substantial increase in the formic acid content within the plant tissues took place. Increases in acetic and lactic acid contents were very small.—Los Angeles County Air Pollution Control District, Calif.

1536. Rui, D., and Romanelli, O.
La difesa antigrandine in Italia nell'anno 1954. **(Hail control in Italy in 1954.)**
Agric. Venezie, 1955, **9**: 568-88, bibl. 1, illus.

One hundred and thirteen hail control projects, considerably more numerous than in the previous year, were conducted covering 570,000 ha. in 24 provinces, 97,500 rockets being fired from 9,800 sites. Of the 104 projects costed, 74 cost less than 1,000 lire per ha., 24 cost between 1,000 and 3,000 lire and 9 exceeded 3,000. Facts and figures are given on the campaign in general and in each commune. Silver iodide generators were used to a limited extent and gave satisfactory results.—Uffic. tecn. antigrand., Verona. [For results in previous years see *H.A.*, 23: 3987, 3988 and 25: 1441.]

Viruses.

(*See also* 1640p, s, 2319, 2335.)

1537. Posnette, A. F.
Virus diseases and fruit tree propagation.
Gdng illus., 1954, **71**: 239, illus.

Virus diseases, among which those of cherries and plums are at present more important than those of apples, will become progressively more prevalent if proper precautions are not taken by nurserymen in propagation. Brief advisory notes are given on these precautions.

1538. Baumann, G., and Klinkowski, M.
Ein Beitrag zur Analyse der Obstvirosen des mitteldeutschen Raumes. **(A report on the diagnosis of fruit viruses of central Germany.)**
Phytopath. Z., 1955, **25**: 55-71, bibl. 30, illus.

Symptoms and transmission of 5 virus diseases occurring in central Germany are described. The viruses

* Reprinted from *Proc. Governor's Conf. and Exhibit on Atmospheric Pollution, N.J. St. Dep. Health, Trenton, 1952*, 1955, pp. 23-31.

are apple mosaic, line pattern of peach and of plum, ring spot of sweet cherry, and "Stecklenberger disease" of sour cherry. The symptoms of the last disease resemble those of sour cherry necrotic ring spot in the occurrence of necrotic spots on the lower leaves and inhibition of leaf and shoot growth. However, symptoms appear on young leaves of spring shoots throughout the summer, and sometimes leaf enation may occur. It is therefore suggested that "Stecklenberger disease" is caused by a particular strain of necrotic ring spot or by a complex of which necrotic ring spot is a component. High proportions of diseased trees (70-80%) have been found in 10- to 15-year-old orchards in central Germany.—Inst. Phytopath., Aschersleben.

1539. YARWOOD, C. E.
Mechanical transmission of an apple mosaic virus.
Hilgardia, 1955, **23**: 613-28, bibl. 32, illus.
A virus form of apple mosaic was transmitted mechanically to tobacco, *Nicotiana glutinosa*, tomato, cucumber, globe amaranth, sunflower, broad bean, French bean, cowpea, guar (*Cyamopsis tetragonoloba*) and pokeweed (*Phytolacca americana*), but not to apple. [From author's summary.]—Exp. Stat., Berkeley, Calif.

1540. MILLIKAN, D. F., AND GUENGERICH, H. W.
The use of antimetabolites to control stone fruit viruses.
Plant Dis. Reptr, Suppl. **234**, 1955, p. 131.
Investigations were started in 1954 to see whether it might be possible, by the use of 8-azoguanine and thiouracil alone or in combination, to eliminate infection from buds in a desirable plum that has not been introduced because of virus infection. Treatment was started as soon as the tree leafed out and was continued until terminal growth ceased at which time bud wood was removed for propagation. Growth in 1955 of trees developing from the inserted buds was unusually vigorous and appeared to be free from the mottle for about 2 months, after which time the mottling became evident. Buds from these trees were inserted in Shiro-fugen to determine whether ring spot infection had been arrested in any of the meristematic tissue during the previous season. Four trees out of 60 appeared to be free from ring spot as indicated with the Shiro-fugen indicator host. Two of the virus-free trees developed from buds treated with thiouracil and two from buds treated with 8-azoguanine. It appears that there is some ameliorating affect due to antimetabolites, but the period of protection is evidently insufficient to obtain completely virus-free budwood.—Univ. Missouri, Columbia.

1541. FRIDLUND, P. R., AND KING, T. H.
Survival of the necrotic ring spot virus in plums during periods of extremely cold weather.
Plant Dis. Reptr, 1955, **39**: 807.
Necrotic ring-spot virus in plum shoots remained active and unchanged during two 10-day periods of cold weather with temperatures ranging from +2 to −20° F. and +5 to −25° F. It is thought that the virus cannot be inactivated by low temperatures that are not also lethal to the host plants.—Minn. agric. Exp. Stat.

1542. MILLIKAN, D. F., JR.
Stone fruit virus investigations. I. Inoculation studies of the ring spot virus complex in sweet cherry.
Res. Bull. Mo. agric. Exp. Stat. **582**, 1955, pp. 23, bibl. 20, illus.
A study of the ring spot complex on sweet cherry has indicated that strains of virus thought to be the same on the basis of symptoms expressed on sour cherry are different entities, although closely related. It is suggested that necrosis symptoms occurring on sweet cherry are caused by the ring spot component, whether it occurs alone or in combination with yellows. Sweet cherry varieties could be divided into 2 groups on the basis of host response to ring spot inoculations. Severe necrosis was caused by some ring spot strains while others caused necrosis limited to a few tip spurs. These symptoms may or may not be accompanied by foliar symptoms of necrotic ring spot.

1543. MILLIKAN, D. F.
The influence of infection by ring spot virus upon the growth of one-year-old Montmorency [cherry] nursery trees.
Phytopathology, 1955, **45**: 565-6, bibl. 13.
The chief effect of ring spot virus was the depression of branch growth in June/July.—Univ. Missouri, Columbia.

1544. WILKS, J. M., AND WELSH, M. F.
Sweet cherry foliage indicator hosts for the virus that causes little cherry.
Canad. J. agric. Sci., 1955, **35**: 595-600, bibl. 4, illus.
Certain sweet cherry varieties and seedlings have been shown to display a foliage reaction to the little cherry virus. The symptom is a reddening of the leaf laminae. Some of the varieties and seedlings also show chlorotic mottles and necrotic shot holing. These host reactions are not produced by the latent ring spot viruses that are common contaminants in trees infected with little cherry. Other viruses tested, including those of sour cherry yellows, mora and rusty mottle, have failed to induce the red leaf symptoms. [Authors' abstract.]—Plant Path. Lab., Summerland, B.C.

1545. WILLISON, R. S., WEINTRAUB, M., AND FERGUSON, J. D.
Purification and electron microscopy of viruses causing cherry yellows and related diseases.
Canad. J. Bot., 1956, **34**: 86-103, bibl. 15, illus.
The investigations provided evidence suggesting that the necrotic ring spot virus is not necessarily involved in the etiology of cherry yellows, prune dwarf, tatter leaf or green ring mottle.—Bot. Plant Path. Div., Canada Dep. Agric., Ottawa.

1546. GEISSMAN, T. A.
The flavonoid constituents of normal and virus-infected peach and cherry leaves.
Arch. Biochem. Biophys., 1956, **60**: 21-6, bibl. 16.
Normal and virus-infected peach and cherry leaves have been examined for their flavonoid constituents. Glycosides of kampferol and quercetin and esters of

p-coumaric and caffeic acids were identified in peach leaves; *p*-coumaric acid was identified after alkaline hydrolysis of a cherry leaf extract. Normal and virus-infected leaves show qualitative similarity, but the normal leaves show less of all and very much less of some constituents than do infected leaves. Virus-infected cherry leaves contain, per unit of dry weight, about three times as much kampferol and quercetin as normal leaves, and nearly twice as much caffeic acid. [Author's summary.]—Univ. Calif., Los Angeles.

1547. Wilson, N. S., Jones, L. S., and Cochran, L. C.
An eriophyid mite vector of the peach-mosaic virus.
Plant Dis. Reptr, 1955, **39**: 889-92, bibl. 2, illus.
Anon.
Found: how peach mosaic is spread.
Agric. Res. Wash., 1955, **4**(3): 15.

A mite of the genus *Eriophyes*, apparently an undescribed species, has been found to be a vector of the peach-mosaic virus. [From authors' abstract.]—Agric. Res. Serv., U.S. Dep. Agric.

1548. Stace-Smith, R.
Studies on *Rubus* virus diseases in British Columbia. I. Rubus yellow-net.
Canad. J. Bot., 1955, **33**: 269-74, bibl. 4, illus.

A virus disease occurring on Himalaya blackberry (*Rubus procerus*) was transmitted to Washington red raspberry (*R. strigosus*), tropical black raspberry (*R. albescens*) and North American black raspberry (*R. occidentalis*). A net-like chlorosis of the tissue bordering the smaller leaf veins is the characteristic symptom, thus the name "Rubus yellow-net" is proposed for the virus and disease. The virus is transmitted by *Amphorophora rubi*. [From author's abstract.]—Plant Path. Lab., Canada Dep. Agric., Vancouver, B.C.

1549. Stace-Smith, R.
Studies on *Rubus* virus diseases in British Columbia. II. Black raspberry necrosis.
Canad. J. Bot., 1955, **33**: 314-22, bibl. 9, illus.

Raspberry indexing in British Columbia has demonstrated that several varieties are carrying a latent virus that induces mild symptoms in other red raspberry varieties and severe symptoms on black raspberries (*Rubus occidentalis*). The name black raspberry necrosis is proposed for the disease and virus. The virus is transmitted by *Amphorophora rubi*. [From author's abstract.]—Plant Path. Lab., Canad. Dep. Agric., Vancouver, B.C.

1550. Schöniger, G., and Bauer, R.
Erdbeervirosen in Deutschland. I. Befund nach Pfropfung verschiedener Sorten auf *Fragaria vesca* L. **(Strawberry viruses in Germany. I. Results of grafting different varieties on *Fragaria vesca*.)**
Phytopath. Z., 1955, **24**: 443-54, bibl. 29, illus.

Strawberry varieties were tested for viruses by grafting on to *Fragaria vesca*. Tests on 52 varieties, including selections and clones, have been completed, and 75% were found to be carrying viruses. Virus symptoms have been classified in 5 groups, which are described.—Max-Planck-Inst., Züchtungsforschung, Voldagsen.

1551. Vega, J., and Alcalde, A. J.
La degeneración infecciosa de la vid en Mendoza. **(Vine infectious degeneration in Mendoza.)**
(*Publ.*) *Centro reg. andino Invest. agropec. Mendoza* **11**, 1955, pp. 16, bibl. 45, illus.

Advisory notes are given on the symptoms and control of infectious degeneration which has been recorded in Mendoza province.

1552. Pieri, G.
Indagine sulla diagnosi della degenerazione infettiva della vite con mezzi chimici. **(Research on the diagnosis of vine infectious degeneration by chemical methods.)** [English summary 7 lines.]
Ann. Sper. agrar., 1955, Vol. **9**, No. 6, Suppl. pp. lxxxix-xciii, bibl. 5.

Lindner's reagent [see *H.A.*, 18: 2552] gave positive results, turning yellow to red, dependent on the degree of infection, in contact with leaves of European and American vines suffering from infectious degeneration, and green in contact with healthy leaves.—Staz. sper. Vitic. Enol. Conegliano. [See also *H.A.*, 25: 2622.]

Bacteria.

1553. McKeen, W. E.
Pear blast on Vancouver Island.
Phytopathology, 1955, **45**: 629-32, bibl. 10, illus.

Pseudomonas syringae causes a blossom blight on pears on Vancouver Island and occasionally multiplies so rapidly that a severe epidemic occurs in individual orchards. The pathogen was found to be very sensitive to streptomycin and aureomycin in laboratory tests, and antibiotic dusts or sprays may give effective field control.—Plant Path. Lab., Saanichton, B.C.

1554. Goodman, R. N.
Late season twig-infection, a serious limitation to the effectiveness of antibiotic sprays for fireblight control.
Plant Dis. Reptr, 1955, **39**: 922-5, bibl. 3.

In experiments on Jonathan apple trees in 2 localities fireblight infections developed abundantly on vegetative growth 2–5 weeks after full bloom, making their first appearance even before the agrimycin spray schedule was completed. This suggests that antibiotic sprays are relatively ineffective against the late or "midseason" form of twig infection.—Univ. Missouri.

1555. Ark, P. A.
Use of streptomycin-pyrophyllite dusts against pear blight and walnut blight.
Plant Dis. Reptr, 1955, **39**: 926-8, bibl. 9.

Streptomycin-pyrophyllite dusts, unlike mixtures with bentonite, liberate sufficient streptomycin to afford a control of fire blight comparable with that obtained with wettable streptomycin spray or copper-lime dust. The pH of the pyrophyllite does not appear to influence either the liberation of streptomycin or the stability of the dust. The dust mixture gave somewhat less control of walnut blight than a streptomycin spray but was

better than copper dust. [Author's summary.]—Dep. Plant Path., Univ. Calif., Berkeley.

Fungi.

(*See also* 1485, 1505, 1640c, l.)

1556. (Swales, J. E.)
Apple-scab.
A.R. Dep. Agric. British Columbia, 1954, 1955, pp. 32-3.

The results of experiments showed that the use of the surfactants Triton B-1956 or Miller's MJ1 in the fungicide sprays greatly improved the degree of apple scab control with a lime-sulphur and Ferbam-wettable sulphur programme. Slight injury was caused by the Ferbam-wettable sulphur-surfactant sprays.

1557. Ferraguti, A.
La lotta contro la ticchiolatura in base alle esperienze acquisite negli ultimi anni nel Ferrarese. **(The control of scab in the light of experience acquired in recent years at Ferrara.)**
Not. Mal. Piante, 1955, No. 33, pp. 3-9.

The course and control of some past outbreaks of apple scab (*Venturia inaequalis*) at Ferrara are discussed. Recommendations for the future are: (1) An eradicant spray of bordeaux mixture at a high concentration or of calcium polysulphide at 6° Bé should be applied not later than 20 March. (2) Four preventive sprays with a good fungicide should be applied during the course of the season, the first at budburst, the second 8–9 days later and the third and fourth after rain between the appearance of the clusters and petalfall.

1558. Roosje, G. S.
Het mycologisch onderzoek. **(Mycological research.)** [English summary 1 p.]
Jversl. Proefstat. Fruit. Volle Grond, Wilhelminadorp, 1954, 1955, pp. 33-41, illus.

Apple scab. Curative control of scab on potted trees was obtained with 0·07% AAventa, 0·2% Nirit 45, 0·3% captan, 0·2% ziram and 0·2% TMTD, when applied at definite periods after the leaves were wetted. Curative control on M.II in the nursery was obtained with 0·1% AAventa and 0·125% TMTD. Against established scab lesions 0·1% AAventa and 0·2% Nirit 45 were the most effective. In field tests leaf damage to Cox was caused by 0·05% AAventa. *Apple powdery mildew* (*Podosphaera leucotricha*). Field tests showed that better control was obtained with wettable S sprays (Thiovit) than with colloidal S (laline).

1559. Kaszonyi, S.
Faiskolai esonthéjasok cilindrosporiumos betegsége. **(*Cylindrosporium* in stone fruit nurseries.)** [English and Russian summaries.]
Növényterm., 1955, **4**: 337-50, bibl. 9, illus.

The Prunus hosts of *Cylindrosporium padi* in Hungary are listed and notes are given on the symptoms of the disease in young grafted plants and on the biology of the pathogen. Effective control is obtained with 0·5% bordeaux mixture or 0·5% calcium sulphite (the latter diluted in summer with ferrous sulphate) applied 7 times between the appearance of the first 2 foliage leaves about 9th April and the end of August or beginning of September.

1560. Morschel, J. R. G.
Shot hole in apricots on Murrumbidgee Irrigation Areas.
Agric. Gaz. N.S.W., 1955, **66**: 545-7, 551, illus.

There are 2 distinct shot hole diseases in the Murrumbidgee Irrigation Areas. In one the blemishes, which are of unknown cause, are mainly confined to the exposed side of the fruit and disappear by harvest time. In the other the blemishes, due to *Clasterosporium carpophilum*, fail to disappear and by harvest time have developed into raised scabs or sunken lesions. The spray programme originally recommended failed to control the disease. New recommendations based on further trials are: (1) leaf fall—10-10-100 bordeaux plus ½ gal. white oil, or 10-5-10-100 zinc bordeaux plus ½ gal. white oil, or 5 lb. copper oxychloride, or 1½ lb. 80% thiram per 100 gal. water; (2) early blossoming—as above; (3) shuckfall—1½ lb. 80% thiram per 100 gal.

1561. Carter, M. V.
Apricot gummosis—a new development.
J. Dep. Agric. S. Aust., 1955, **59**: 178-84, illus.

Investigations at the Waite Agricultural Research Institute have led to the discovery of an air-borne *Eutypa* spore which develops on gummosis-killed apricot limbs and can spread the disease over great distances. The destruction of infective material is recommended.

1562. Oyer, E. B.
The effect of tetrachloroethylene and related compounds on some physiological processes of fungus and higher plant tissues.
Diss. Abstr., 1955, **15**: 1708-9, being *Publ.* 13938 of 100 pp.

The relative toxicity of TCE and 3 related compounds to spores of *Monilia fructicola* was determined. The mycelium was more sensitive to TCE than were the spores. The incidence of brown rot in artificially inoculated peaches was greatly reduced by 18 hr. fumigation with TCE at 18 mg./litre. The fruits were injured at TCE concentrations above 40 mg./litre, and little control of brown rot was obtained at concentrations of less than 8 mg./litre. The vapours of TCE stimulated respiration of pre-climacteric peaches and apples. TCE increased the permeability of cell membranes of red beet root discs.

1563. Ogawa, J. M., and Charles, F. M.
Powdery mildew on peach trees.
Calif. Agric., 1956, **10**(1): 7, 16, illus.

Trees of Paloro peach were used in trials on the control of peach powdery mildew (*Sphaerotheca pannosa*). The chemicals used were Karathane WD, dinitro (1-methyl heptyl) phenyl crotonate, Acti-dione-cycloheximide, wettable sulphur and liquid lime-sulphur; 3 protective sprays were given. At harvest, sprayed trees produced about 20% more marketable fruit than unsprayed trees. Karathane WD and sulphur gave equal reduction of mildew on fruits, and as foliage sprays Karathane and lime sulphur were equally effective. Karathane WD was slightly phytotoxic to the leaves. Sprays of Karathane WD and lime sulphur did not show any apparent eradicant effect.

1564. Helton, A. W.
"Sleepy" fungus turns rampant.
Bett. Fruit, 1955, **50**(5): 5, 15-17, illus.

Considerable dieback was first observed on Italian prune trees, and the fungus isolated was found to be a species of *Cytospora*. Further field observations have shown that *Cytospora* may be found in most tree fruit varieties. There are several strains of the fungus. Symptoms vary from the persistence of dried-up leaves on the shoots to small pale leaves in spring; wilting often occurs. Cankers generally start as small brown or necrotic spots which develop rapidly. The fungus appears to be most active at the pruning season, hence the control measures recommended include sanitation measures during this time.

1565. English, W. H.
Further experiments on the control of surface mold and rot of Kadota figs.
Proc. 8th annu. Res. Conf. Calif. Fig Inst., 1954, pp. 16-20.

The results and conclusions from experiments in 1953 were: (1) Smudge or surface mould (*Cladosporium* sp.) appears to be found almost entirely on low-vigour trees that produce subnormal vegetative growth. It occurs on fruits at all stages of maturity, but usually does not become evident until early in September, and then becomes progressively worse as the season advances. A single application of a carbamate or copper-containing spray early in September appears effectively to check this disease for at least three weeks. (2) Alternaria rot generally does not become serious until after the first of September unless rainfall occurs. More frequent picking, so as to prevent the fruit from becoming overmature, is one means of reducing severity. Three applications of Zinc Coposil spray failed to reduce significantly the amount of Alternaria rot, but two or three applications of Dithane Z78 resulted in approximately a 50% reduction. Applied as dusts both of these fungicides reduced the disease somewhat in fruit picked at optimum maturity, but neither effectively checked the rot in overmature fruit.

1566. English, W. H.
Late pruning again reduces Phomopsis canker infection.
Proc. 8th annu. Res. Conf. Calif. Fig Inst., 1954, pp. 20-2.

Seventeen spray materials, including the organic mercury compound Tag, applied shortly after pruning, failed to reduce significantly the amount of canker infection. No spray material has been found that is more effective than the organic mercury fungicides, and even they are relatively ineffective in some years. Contaminated pruning shears have been demonstrated to be an important means of disease spread. Sterilization of shears after they had cut through a canker resulted in a reduction in the amount of infection. Pruning in March has resulted in considerably less infection than pruning in January. [From author's summary.]

1567. Minev, K.
Pomegranate rot caused by *Aspergillus niger*.
[Yugoslav, with English summary 5 lines.]
Annuaire Fac. Agric. Sylvic., Skopje, 1951/52, 1954, **5**: 186-190, bibl. 4, illus.

Aspergillus niger has been found to cause fruit rot on pomegranates both before picking and during storage. Rotting is more severe on damaged fruits.

1568. Huffman, J. W.
Plastic mulch reduces strawberry fruit rot.
Market Grs' J., 1955, **84**(11): 9, illus.

Polyethylene sheeting laid on the soil beside rows of irrigated strawberries considerably reduced losses due to fruit rot. The sheeting was placed in early spring covering the top of the rows under the plants, and drainage holes were made at 2–3 inches apart. The berries lie on the sheeting and not on the wet soil.

1569. Coombe, B. G.
Diseases of grapevines.
J. Dep. Agric. S. Aust., 1955, **59**: 145-50, illus.

Advice is given on the fungicidal control of the 3 chief diseases of vines in South Australia, namely, downy mildew (*Plasmopara viticola*), oidium (*Uncinula necator*) and black spot (*Elsinoë ampelina*). Susceptible varieties are named.

1570. Baldacci, E., and Fogliani, G.
Le malattie della vite secondo i dati di una nostra inchiesta. **(Information obtained as a result of an enquiry on vine diseases.)**
Atti Accad. ital. Vite, **1954**, 1955, **6**: 173-218, maps.

A summary is given of the replies received to fact-finding questionnaires sent out by the Institute of Plant Pathology to vine growers in all parts of Italy on downy mildew (*Plasmopara viticola*) and powdery mildew (*Uncinula necator*).

1571. Fontana, P., and Zampighi, G.
Attività antiperonosporica, persistenza e traslocazione dell'etilen bis ditiocarbammato di zinco sulla vite. **(Efficacy against vine downy mildew, persistence and translocation of zinc ethylene bisdithiocarbamate on vines.)** [English and French summaries 10 lines each.]
Ann. Fac. Agrar. Univ. cattol. S. Cuore, 1955, **51**: 176-86, bibl. 5.

Dithane Z-78 wettable powder with or without 8% added copper was compared with bordeaux mixture and with Caffaro powder containing 16% copper in experiments in Piacenza on the control of downy mildew (*Plasmopara viticola*) on Malvasia vines. The products were applied 8 times between early May and mid-July, the concentrations at first being 0·3% for the dithane and 1·0% for the copper and later 0·5 and 1·5% respectively. The dithane (1) was easily washed off by rain; (2) was translocated to young leaves produced after spraying; (3) was as efficacious as the coppers, and (4) was more efficacious without than with added copper. [See also *H.A.*, 25: 3789.]

1572. Boubals, D., Vergnes, A., and Bobo, H.
Essais de fongicides organiques et organo-cupriques dans la lutte contre le mildiou de la vigne effectués en 1955. **(Tests on organic and organo-cupric fungicides for the control of vine downy mildew in 1955.)**
Progr. agric. vitic., 1956, **145**: 29-37, 63-7, bibl. 4.

The climatic conditions were those commonly encoun-

tered in southern France and downy mildew (*Plasmopara viticola*) scarcely appeared before or during flowering but was fairly severe from July onwards. The chief results and conclusions were: (1) A single application of 2% bordeaux mixture when growth stopped or shortly afterwards did not compensate for the short residual effect of organic fungicides applied earlier in the season, and it therefore seems best to change over to copper when the fruit ceases to be in danger of attack, viz. at the beginning of July. (2) None of the organic fungicides tested had adequate residual effect. (3) 37·5% copper oxychloride plus 15% zineb used at 0·4% had a residual effect inferior to that of 2% bordeaux, but this can be overcome either by using it at 0·8%, or (possibly) by means of an adjuvant, or by the use of 2% bordeaux in July/August.—Lab. Rech. vitic., École nat. Agric. Montpellier. [For previous year see *H.A.*, 25: 1477.]

1573. Turian, G., and Staehelin, M.
Essais de lutte chimique contre les spores du champignon du coitre de la vigne dans le sol. (*Coniella diplodiella* [Speg.] Pet. et Syd.) **(Chemical control of spores of white rot fungus of vines in the soil.)** [German, English and Italian summaries ½ p. each.]
Landw. Jb. Schweiz, 1955, **4**: 799-808, bibl. 4.

In laboratory tests the toxicity of TMTD to spores of *Coniella diplodiella* was confirmed. Greenhouse tests showed that 1 g. TMTD per kg. of soil was the minimum concentration for efficiency, and at this concentration the autotrophic soil microflora was not apparently affected. In field tests a mixture of 25% TMTD and 25% sulphur in calcium carbonate was used which, at a rate of 4 kg. per acre, destroyed all *Coniella* spores in the top soil.—Lausanne. [For earlier work see *H.A.*, 25: 1477.]

1574. Rosella, E., and Chabert, E.
Efficacité comparée de différents sels d'ammonium quaternaire contre certains champignons phytopathogènes en viticulture en particulier. **(Comparative efficacy of various quaternary ammonium salts against certain phytopathogenic fungi, with particular reference to viticulture.)**
C.R. Acad. Agric. Fr., 1955, **41**: 741-5, bibl. 7.

Tests on the control of *Botrytis cinerea* in must suggested that quaternary ammonium salts might be useful against vine diseases such as downy mildew.

1575. Large, J. R.
Control of scab and other foliage diseases of pecans.
A.R. Fla agric. Exp. Stats, 1954, pp. 120-1.

Dry weather during the early flush of pecan growth retards scab development, so that the first spray application may be made in mid-May, followed by sprays at 3-weekly intervals. Four or 5 applications of bordeaux mixture 6-2-100, plus the application of 1 pint of malathion in May and July, gave very effective control. In 1953 a zineb and summer oil spray, and split bordeaux spray followed by ziram, compared favourably with bordeaux.

1576. Sommer, N. F.
Sunburn predisposes walnut trees to branch-wilt.
Phytopathology, 1955, **45**: 607-13, bibl. 8, illus.

Hendersonula toruloidea Nattrass failed to infect, or at most was weakly parasitic to, normal branches of vigorous walnut trees inoculated with it. When branches even mildly sunburned were inoculated, however, extensive disease cankers developed. Severe branch-wilt damage is limited to orchards that are subjected to high summer temperatures. Here abundant infection courts may result from sunburn, and favorable temperatures for disease canker development are present. While high relative humidities were found necessary for spore germination, the required moisture evidently is provided by host tissues. The application of whitewash effectively reduced disease canker development when inoculations were made in branches exposed to the sun. Evidently the major effect of the whitewash is a reduction in the amount and severity of the sunburning which predisposes the branches to colonization by the fungus. [Author's summary.]—Univ. Calif., Davis. [See also *H.A.*, 25: 289.]

1577. Schad, C., and Grente, J.
Recherches d'arboriculture fruitière de la Station d'Amélioration des Plantes de Clermont Ferrand. III. Amélioration du noyer. Compte rendu des travaux effectués en 1953. **(Research on fruit tree growing at the Station d'Amélioration des Plantes at Clermont Ferrand. III. Walnut improvement. Report on research conducted in 1953.**
Ann. Amél. Plantes, 1955, **5**: 286-301, bibl. 3, illus.

Research on ink disease (*Phytophthora cambivora* and *P. cinnamomi*) included control by soil disinfection, by the use of resistant types of *Juglans regia* and resistant species and hybrids of *Juglans*, and by the use of *J. nigra* as a rootstock.

Nematodes.

(*See also* 1640i, 2339.)

1578. Goheen, A. C., and Williams, C. F.
Seasonal fluctuations in the population of meadow nematodes in the roots of cultivated brambles in North Carolina.
Plant Dis. Reptr, 1955, **39**: 904-5, bibl. 4.

Carolina and Earliness, two varieties of trailing blackberries, were found to support smaller populations of meadow nematodes, *Pratylenchus* sp., than other varieties of brambles at Raleigh, North Carolina, on the basis of counts made during a year. The maximum population of meadow nematodes in the roots of brambles was found about June 1, after which it declined rapidly and remained at a lower level through the summer, fall, and winter until plant growth started again in spring. [Authors' summary.]—Agric. Res. Serv., U.S. Dep. Agric.

1579. Goheen, A. C.
D-D fumigation of soil for the control of parasitic nematodes in strawberries.
Plant Dis. Reptr, 1955, **39**: 906-8, bibl. 5, illus.

Preplanting fumigation of a clay loam at Beltsville, Maryland, with D-D at the rate of 30 gal. per acre reduced the population of meadow nematodes [*Pratylenchus* spp.] in the soil so that it was significantly lowered in the roots of Aroma and Blakemore strawberry plants sampled at the end of the first fruiting season. In the clay loam used in the experiment fumigation did not affect yields the first fruiting season, but it improved them significantly the second. [Author's summary.]—Agric. Res. Serv., U.S. Dep. Agric.

1580. Tarjan, A. C.
Use of 3-p-chlorophenyl-5-methyl rhodanine as a soil amendment for nematode-infected strawberries.
Plant Dis. Reptr, 1955, **39**: 812-14, bibl. 7, illus.

3-p-chlorophenyl-5-methyl rhodanine (N-244) was applied to soil in which young strawberry plants were growing. Yield data obtained the following year showed that the most effective treatment was 300 lb. per acre, which resulted in a yield of 32 qt. per 80 feet of row compared with 10 in the controls. Nematode populations, chiefly *Pratylenchus penetrans*, in treated soil were lower in numbers than in untreated soil.—Rhode Island agric. Exp. Stat., Kingston. [See also *H.A.*, 25: 686.]

1581. Miller, P. M.
Control of black root rot of strawberries with nematocide-fungicide combinations.
Plant Dis. Reptr, 1956, **40**: 45-7, bibl. 8.

Vapam [N-methyl dithiocarbamate dihydrate], and ethylene dibromide plus Terrachlor [20% pentachloronitrobenzene]—treatments having both nematocidal and fungicidal properties—gave better control than either nematocides or fungicides used alone. [From author's summary.]—Conn. agric. Exp. Stat., New Haven.

1582. Brooks, A. N.
The sting nematode, *Belonolaimus gracilis*, Steiner.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 157-8.

The sting nematode is the most important nematode attacking strawberry roots in the Plant City area. Infested plants stop growing and gradually decline in size. Crabgrass and sesbania are hosts of the nematode. Other crops on which stunting has been observed include eggplant, pepper and okra. Soil fumigation with DD greatly reduced nematode populations. Rotary tillage also tended to reduce nematodes.—Strawberry Field Lab., Plant City.

Mites.

1583. Wilhelminadorp.
Het entomologisch en acarologisch onderzoek. **(Entomological and acarological research.)** [English summary 3 pp.]
Jversl. Proefstat. Fruit. Volle Grond, Wilhelminadorp, 1954, 1955, pp. 42-58, illus.

Fruit tree red spider mite. Ovicidal tests were carried out in the field, and the following results obtained: Shell-anti-spintolie applied just before or during hatching of winter eggs gave fairly good results in 2 out of 3 years; EPN resulted in a high mortality of mites and eggs; PCBS caused a high mortality of summer eggs, but was somewhat phytotoxic; chlorocide was effective against summer eggs and larvae, and had a long residual effect; PCPCBS also caused a fairly high mortality of summer eggs, but was less persistent. Of the acaracides tested parathion and diazinon had a good but not persistent effect; malathion had a similar effect but was even less persistent; systox and pestox had much longer residual effects. *Blackcurrant gall mite.* Wettable sulphur gave better and safer control than lime sulphur. *Lygus* spp. Preliminary tests showed that parathion and diazinon gave effective control. *Woolly aphid.* Effective control was obtained with 0·05% systox and 0·1% metasystox, but sprays had to be continued to prevent a late-summer build-up. *Green apple aphid.* April applications of 0·03–0·06% parathion liquid 25% gave the best control. *Codling moth.* The biology of codling moth was studied. In field tests malathion and parathion liquids and diazinon emulsifiable oil gave equally effective control.

1584. Post, A.
Het biocoenotisch onderzoek van boomgarden. **(Biocoenotic research in orchards.)** [English summary ½ p.]
Jversl. Proefstat. Fruit. Volle Grond, Wilhelminadorp, 1954, 1955, pp. 65-9, illus.

A study of the effects of cultural practices on mite and insect populations in the orchard has been started. In the first year no marked differences in leaf and flower bud relations, fruit set, leaf size or mineral content of the leaves have been observed between the plots.

1585. Morris, D. S.
Orchard mite control. The new acaricides.
J. Agric. Vict., 1955, **53**: 551-5, 558, bibl. 1, illus.

Field trials were carried out in 1954–55 with new acaricides for the control of *Bryobia praetiosa* and *Tetranychus urticae* on fruit trees. Excellent control of *Bryobia* for 6–8 weeks on Delicious apples and Williams' pears was given by single applications of Ovotran, PCPBS and chlorparacide in late November. Parathion and malathion gave rapid initial reduction of mites on apples, but 1 spray of either of these materials was inferior to a single application of Ovotran, PCPBS or chlorparacide over a period of 6–8 weeks. In tests against the overwintering eggs of *Bryobia* red oil, "Superior Oil" and PCPBS were superior to Ovotran and chlorparacide. Aramite was the most effective of the materials used for red spider control.

1586. Mathys, G.
Étude faunistique des acariens des pommiers en Suisse romande. **(Studies on the mite species of apple trees in the French-speaking part of Switzerland.)** [German, English and Italian summaries.]
Landw. Jb. Schweiz, 1955, **4**: 815-25, bibl. 12, illus.

Mites occurring on apple trees in Western Switzerland are grouped as phytophagous, predatory and saprophagous. *Typhlodromus* species were the most effective predators of *Metatetranychus ulmi*, *Tetranychus urticae* and *Bryobia praetiosa*. It was shown that

Typhlodromus *tiliae* would feed on vegetable and acarid sap, and did not leave the host when no mites were present. In fungicidal and insecticidal tests *T. tiliae* populations were completely destroyed by parathion, systox and zineb. Nirosan, copper oxychloride and wettable sulphur (applied at 20° C.) had a less serious effect on *T. tiliae* populations.—Lausanne.

1587. Mathys, G.
Les problèmes du bryobe précieux (*Bryobia praetiosa* Koch) dans le cadre de la lutte contre les araignées rouges. (**The problem of *Bryobia praetiosa* in relation to red spider control.**)
Rev. romande Agric. Vitic., 1955, **11**: 93-5, illus.

Advice is given on the control of the 4 biotypes of *Bryobia praetiosa* found in Switzerland. Of these, 2 are of horticultural importance, namely, those attacking fruit trees and gooseberry bushes.

1588. Chant, D. A.
Predacious spiders in orchards in South-Eastern England.
J. hort. Sci., 1956, **31**: 35-46, bibl. 17, illus.

A list of the species of spiders found in some sprayed and unsprayed orchards in Kent and Essex from 1952–55 is presented, together with an indication of their relative abundance. It is shown that certain common species of spiders feed readily on phytophagous mites, the numbers consumed tending to increase with the density of prey. The results are given of observations on the range of common orchard-inhabiting insects and mites acceptable as food to various species of spiders, and notes are included on the habits of spiders of the families Theridiidae and Linyphiidae. [Author's summary.]—East Malling Res. Stat.

1589. Storkan, R. C., and Lembright, H. W.
Tarpaulin fumigation of strawberry plants with methyl bromide for mite control and plant response.
Down to Earth, 1955, **11**(3): 12-14, illus.

In field trials in California dosages of 2–2½ lbs. of methyl bromide per 1,000 sq. ft. were found to be satisfactory. Exposures varied between 2 and 3 hours at 65–85° F., depending on the season and the temperature. Maximum control of mite and best crop production were obtained when fumigation was performed during plant dormancy.—Neil A. Maclean Co., and Dow Chem. Co., San Francisco.

1590. Manolache, C. I., and Duschin, I.
Untersuchungen über die Bekämpfung der Spinnmilbe *Tetranychus althaeae* v. Hanst. durch Winter- und Sommerbehandlungen. (**Control of the mite *Tetranychus althaeae* by winter and summer treatments.**)
NachrBl. dtsch. PflSchDienst, Berlin, 1955, **9**: 209-15, bibl. 56.

The most effective winter treatments for control of *Tetranychus* on vines were 22–25% DNOC at 1·5% or 20% lime-sulphur sprays applied in April. Schradan, pestox and parathion gave effective control when applied in the summer.

1591. Günthart, E.
Das Rote-Spinne-Problem im Weinbau. (**The problem of red spider in vinegrowing.**)
Schweiz. Z. Obst-u. Weinb., 1956, 65: 14-20, bibl. 18, illus.

The importance of red spider mite predators is discussed, with particular reference to *Typhlodromus tiliae*. *Typhlodromus* is little affected by common fungicidal sprays, but phosphoric acid esters, parathion and some materials used for control of vine moth [*Conchylis ambiguella*] are very toxic. Experiments have shown that red spider damage may be avoided, even without the help of *Typhlodromus*, by applying an acaricide with the first fungicidal spray, when the new shoots are 15–25 cm. long.—Chem. Fabrik Dr. R. Maag, Dielsdorf.

1592. Wildbolz, T.
Zur Bekämpfung der Kräuselmilbe an Reben. (**The control of *Phyllocoptes vitis* on vine.**)
Schweiz. Z. Obst-u. Weinb., 1955, **65**: 89.

Sulphur sprays gave the most satisfactory mite control on vines at the bud swelling stage. Later infestations could be controlled by phosphoric acid ester sprays.

Insect pests.

(*See also* 1640j, k, t, 1699, 2340b.)

1593. Strietman, H.
Drie jaar bloedluisbestrijding. (**Three years of woolly aphid control.**)
Fruitteelt, 1956, **46**: 116.

Materials which have given satisfactory control of woolly aphid are parathion, systox, malathion, diazinon and endrin. The first spray should be applied when the infestation starts, and repeated after 5–6 weeks.

1594. Soenen, A., and Vanwetswinkel, G.
Le problème du puceron lanigère. (**The woolly aphid problem.**)
Fruit belge, 1956, **24**: 1-6, 26-31, illus.

The subjects covered are biology, the present problem, and biological and chemical control. In tests in 1955 systox destroyed all colonies reached by the spray. Promising results were obtained in 1955 in preliminary experiments on a new method of control whereby a ring of bark 25 cm. wide is scraped down to the wood and a band of wadding soaked in concentrated systox or metasystox (replenished every 2–3 weeks) and protected on the outside by a plastic cover is tied round the trunk over the ring.—Centre Rech. Gorsem.

1595. Michelbacher, A. E.
Further observations on the control of the walnut aphid.
J. econ. Ent., 1955, **48**: 504-9, bibl. 6.

The most critical period for walnut aphid (*Chromaphis juglandicola*) control is from May to August. Unusually high summer temperatures associated with low soil moisture resulted in a high mortality of the aphid. The systemic insecticides systox and schradan gave better control of walnut aphid than the non-systemic insecticides. Single applications of schradan in May controlled aphids until late autumn. Satisfactory control with schradan depends on good coverage and application before the foliage becomes too mature.

Systox was somewhat phytotoxic, and applications should not be made before the trees are in full leaf. Both systox and schradan were very effective against a parathion-resistant strain of aphid.—Univ. Calif., Berkeley.

1596. Wilcox, J., and Howland, A. F.
Control of the strawberry aphid in southern California.
J. econ. Ent., 1955, **48**: 581-3, bibl. 2.

Excellent control of strawberry aphid (*Capitophorus fragaefolii*) was obtained in southern California with dusts of parathion, malathion, Metacide, endrin, demeton and NPD, and with sprays of lindane, schradan, demeton, Isolan, Pyrolan, sulfotepp, Metacide, TEPP plus R-242, NPD, and endrin. Parathion, malathion and Metacide cannot be used on strawberries as they tend to encourage a build-up of the strawberry mite population. Endrin, demeton, lindane, schradan, Isolan and Pyrolan should not be used until more is known of their residual properties. Sulfotepp caused appreciable burn when applied in April.—Ent. Res. Branch, Agric. Res. Serv., U.S.D.A.

1597. Zanardi, D.
Relazione sulle prove di lotta antifillosserica eseguite in un vigneto della zona del Garda con l'impiego degli insetticidi sistemici systox e pestox 66. (**Report on tests on the control of phylloxera in the Garda district with the systemic insecticides systox and pestox 66.**)
Not. Mal. Piante, 1956, No. 34, pp. 51-3.

Foliage sprays at 0·5 l. per vine and soil applications in prepared holes at 5·0 l. per vine of 0·3% systox or 0·6% pestox 66 (6 and 4 times the normal dose respectively) given thrice in June/August gave negative results.

1598. Frick, K. E., and Bry, R. E.
Dormant vs. summer control of the grape mealybug in the Yakima Valley.
J. econ. Ent., 1955, **48**: 607-8, bibl. 3.

Satisfactory control of the grape mealybug (*Pseudococcus maritimus*) was obtained by a delayed dormant spray of ½ lb. actual parathion per 100 gal. or a summer spray of ¼ lb. actual parathion per 100 gal. There was more sooty mould on the fruit after the summer sprays, which were not applied until most of the bunches had honeydew on them.—Irrig. Exp. Stat., Prosser, Wash.

1599. Schvester, D., Milaire, H., and Gireau, R.
Essais de traitements d'hiver sur pêcher contre la cochenille du mûrier: *Pseudaulacaspis pentagona* Targ. (**Tests on the winter treatment of peach against *Pseudaulacaspis pentagona*.**)
Ann. Épiphyt., 1955, **6**: 407-19, bibl. 8.

An account is given of experiments in south-eastern France in which peach trees were sprayed with yellow oil containing either DNC or parathion, vegetable oil alone or vegetable oil plus DNC. The chief conclusions were: (1) Yellow oil plus parathion at the usual rates was virtually useless. (2) Yellow oil plus DNC gave the best results, the maximum safe concentration being 2,500 g. yellow oil and 200 g. DNC per hl. (3) Mixtures prepared with miscible oils were less efficacious than those prepared with emulsifiable concentrates. (4) A rapid spray followed after drying by a second carefully applied is better than a single spray, and under good conditions gives satisfactory control of *P. pentagona*.—Lab. Zool. agric., Saint-Genis-Laval (Rhône).

1600. van de Vrie, M.
Wantsen op vruchtbomen. (**Plant bugs on fruit trees.**)
Fruitteelt, 1956, **46**: 114-15, illus.

In this review of the occurrence of, and damage caused by, *Lygus pabulinus* and *Plesiocorus rugicollis*, results of control experiments are included. In field trials with black currants sprays of parathion and diazinon applied at the end of April gave complete kill within 4 weeks.

1601. Dustan, G. G., and Beaulieu, A. A.
Control of the buffalo treehopper in Eastern Canada.
Publ. Canada Dep. Agric. Sci. Serv., Ent. Div., **958**, 1955, pp. 2, illus.

A description of the buffalo tree-hopper, *Stictocephala* (*Ceresa*) *bubalus*, is given together with notes on its life history. The females injure the tender bark of young apple and pear trees in egg laying. The food plants of the nymphs include potatoes and some sward crops and weeds. Control is by clean cultivation in June, by avoiding inter-planting alfalfa, clovers and potatoes and, where clean cultivation is not practised, by spraying the orchard trees, the cover crops and the shrubs, weeds and grasses adjacent to the orchard with 50% DDT wettable powder at 3 lb. per 100 gal. water in early August.

1602. Turnipseed, G. F., and Mitchell, T. B.
The apple seed chalcid, its distribution and potentials as a pest of apples in North Carolina.
J. econ. Ent., 1955, **48**: 620-1, bibl. 1.

A survey was made of apple seed chalcid (*Torymus druparum*) populations in commercial apple orchards in North Carolina. Yields in 1954 were not materially reduced by this pest, but it is concluded that in years of light fruit set the pest might become of economic importance.—N.C. State Coll., Raleigh.

1603. Baggiolini, M.
La mouche méditerranéenne des fruits (*Ceratitis capitata* Wied.) ravageur occasionnel des pommes. (**The Mediterranean fruit fly, *Ceratitis capitata*, an occasional pest of apples.**)
Rev. romande Agric. Vitic., 1956, **12**: 19-20, bibl. 1, illus.

Late apples such as Golden Delicious may be attacked in years of heavy infestation on apricots and peaches. Attacked fruit should be removed in sorting and should not be stored at temperatures over 11° C. When an attack is anticipated, preventive spraying at the end of winter is desirable.

1604. Jones, S. C.
Fumigation tests with ethylene dibromide for the control of cherry fruit fly eggs, larvae and puparia.
J. econ. Ent., 1955, **48**: 617-18, bibl. 1.

Fumigation tests with fruit and parasites in store

showed that the eggs, larvae and pupae of the cherry fruit fly (*Rhagoletis cingulata*) were all killed by a rate of ½ lb. of ethylene dibromide for 2 hours. Pupae fumigated for 2 hours with ¼ lb. were not all killed. Taste tests showed a slight change in flavour 4 days after fumigation with ½ lb. of ethylene dibromide for 2 hours. A definite off-flavour occurred at ethylene dibromide rates above 1 lb.—Ore. agric. Exp. Stat., Corvallis.

1605. Cox, J. A.
Insecticides for cherry fruit fly control.
J. econ. Ent., 1955, **48**: 575-6.
In orchard trials on the control of cherry fruit fly (*Rhagoletis fausta* and *R. cingulata*) parathion, EPN and diazinon were quite effective. A schedule of lead arsenate in the first maggot spray followed by 2 applications of either parathion, diazinon or EPN at weekly intervals gave excellent control of the fruit fly. Malathion sprays were less effective than parathion in reducing severe infestations. Parathion, EPN and diazinon were quite effective against the immature stages of the fly in the fruit. Preliminary tests indicated that soil applications of chlordane and dieldrin were not very effective in controlling adult emergence.—Pa agric. Exp. Stat.

1606. Richardson, H. H.
Ethylene dibromide and methyl bromide fumigation of apples infested with apple maggots.
J. econ. Ent., 1955, **48**: 483-4, bibl. 8.
Ethylene dibromide and methyl bromide were used in fumigation tests against *Rhagoletis pomonella*. With ethylene dibromide fumigation at ¼ lb./1,000 cu. ft. for 2 hours at 70–76° F. gave complete kills in 3 tests. Methyl bromide gave complete kills at rates of 1–2 lbs./1,000 cu. ft. at temperatures of 70° F. and 87° F.—Ent. Res. Branch, U.S.D.A.

1607. C.S.I.R.O., and N.S.W. Department of Agriculture.
Treatment of fruit-fly infested fruit.
Rur. Res. C.S.I.R.O., 1955, No. 13, p. 13.
Fruits infested with Queensland fruit fly (*Dacus tryoni*) were subjected to low temperature treatments for 14 days at a fruit temperature of 34° F., or for 12 days at 32° F. All stages of the fly were killed; the treatment was used safely on apples, pears, stone fruits and grapes, but not on all oranges. Vapour heat treatment was not practicable. Complete kills of all stages of the fruit fly were obtained by ethylene dibromide fumigation at concentrations of 1 lb. per 1,000 cu. ft. for 2 hours. Among fruits tested only tomatoes and bananas were damaged consistently. For Navel oranges this concentration appeared to be marginal, although it was safe for Valencias.

1608. Sessions, A. C.
Field studies in fig pest control.
Proc. 8th annu. Res. Conf. Calif. Fig Inst., 1954, pp. 38-43.
An account is given of experiments at Clovis in 1953 on the control of vinegar fly [*Drosophila* spp.] and the dried fruit beetle [*Carpophilus* sp.] on Adriatic figs. It is believed that weekly TEPP (Vapotone) sprays, applied rapidly with mechanically operated spray guns, wind machines or vaporizers, using 0·75–1·0 pint in 50 to 100 gal. spray per acre, starting when figs begin ripening, will do more to protect the figs from attack by these insects than any other chemical control procedure yet known.

1609. Summers, F. M., and others.
Flare-up of Oriental fruit moth.
Calif. Agric., 1956, **10**(1): 6, 12, illus.
Larvae of Oriental fruit moth caused serious damage to twigs and fruit of peaches. Trapping tests showed that the first flight of moths began at the early petal-fall period, increasing to a maximum at the end of March. The first spray programme included 3 applications of DDT during petal-fall, one for each of the first 3 broods of larvae, but these did not adequately reduce the infestation. When additional DDT was given, up to 5 or 6 sprays or dusts, the percentage of infested fruit at harvest time was extremely low and few twig-feeding larvae were found.

1610. Brunson, M. H.
Effect on the oriental fruit moth of parathion and EPN applied to control plum curculio on peach.
J. econ. Ent., 1955, **48**: 390-2, bibl. 2.
The populations of oriental fruit moth (*Grapholitha molesta*) were studied in peach orchards at Moorestown, N.J., sprayed with parathion and EPN, and were compared with those in lead arsenate-sprayed orchards. In the former orchards there were reductions of 80% of overwintering brood moths, 90% of the first-brood moths caught in traps, 95% of twigs infested with first and second brood, and 90% in ripe fruit injury.—Ent. Res. Branch, U.S.D.A.

1611. Savary, A., and Baggiolini, M.
Contribution à l'étude de la lutte contre le carpocapse des pommes et des poires (*Enarmonia pomonella* L.). (**Contribution to the study of the control of codling moth on apples and pears.**) [German, English and Italian summaries, ½ p. each.]
Landw. Jb. Schweiz, 1955, **4**: 827-64, bibl. 25, illus.
In 1954 light and food traps were used in an attempt to determine the optimum time to spray for codling moth control, but these did not provide sufficient information. Data obtained from the breeding of larvae and observation on egg laying and meteorological conditions could be used to improve the accuracy of the advisory service. Studies on the biology of codling moth in the orchard have clarified the situation for individual sites, and it is suggested that curative control must develop along these lines. A system for practical use is outlined, in which the biotope is studied, so that preventive measures may be applied, followed by chemical control measures when the moth is active.—Lausanne. [See also *H.A.*, 25: 3808f.]

1612. Vogel, W., Gerber, B., and Staub, A.
Einige Beobachtungen über Biologie und Bekämpfung des Frostspanners. (**Some observations on the biology and control of winter moths.**)
Schweiz. Z. Obst-u. Weinb., 1956, **21**: 28-33, illus.
In small-scale field tests no eggs of winter moth (*Operophthora brumata*) were found on trunk-banded

apple trees, while 136 eggs were found on 10 branch samples of non-banded trees. Counts of egg populations showed that the eggs were concentrated on the upper parts of the trees, especially on the twig tips, which should therefore be very thoroughly sprayed.—Wädenswil.

1613. Michelbacher, A. E., Hitchcock, S., and Retan, A. H.
Filbertworm injury to walnuts.
Calif. Agric., 1956, **10**(1): 11-12, illus.
Harvesting at the correct time has so far given the most effective control of the filbertworm (*Melissopus latiferreanus*) in walnuts. Rapid drying of harvested nuts also reduces damage, as the larvae cannot feed on cured nut meat.

1614. Bongiovanni, G. C.
Lotto contro alcuni microlepidotteri minatori delle foglie di melo. **(The control of some apple leaf miners.)**
Riv. Fruttic., 1956, **18**: 35-40, illus.
Biological and control notes are given on *Leucoptera* (*Cemiostoma*) *scitella*, *Lithocolletis blancardella* and *Nepticula malella*, which are minor pests on apple leaves at Ferrara.

1615. Zeck, E. H.
Sawflies.
Agric. Gaz. N.S.W., 1955, **66**: 600-2, illus.
The Australian sawflies include *Perga dorsalis*, *Phylacteophaga eucalypti* and *Platypsectra interrupta* on eucalyptus, *Caliroa limacina* chiefly on pear and cherry, *Pterygophorus* sp. on *Leptospermum* sp., *Zenarge turneri* on *Callitris* spp., and *Philomastix macleayi* on blackberries. Their larvae eat leaves and can be controlled with DDT or lead arsenate sprays.

1616. Warner, R. M.
Thrips and their control: 1953 observations.
Proc. 8th annu. Res. Conf. Calif. Fig Inst., 1954, pp. 25-7.
DDT and dieldrin gave promising results against thrips on Calimyrna and Adriatic figs.

Birds.

(*See also* 1640q.)

1617. Bouchard, C.
Dégats causés aux fruits par les oiseaux. **(Bird damage to fruit.)**
Rev. d'Oka, 1955, **29**: 114-21.
Notes on the different types of injury caused are followed by lists* of birds attacking certain top and soft fruits and vines and control recommendations.

Rodents.

(*See also* 1640g, h.)

1618. Oderkirk, G. C.
A new rabbit repellent.
Wis. Hort., 1955, **46**: 101, illus.
TNBA, a trinitro-benzene-aniline complex marketed under the name of Ringwood Repellent, is applied as a spray diluted with acetone on shrubs and small trees and by painting on larger trees, preferably in November. It affords virtually complete protection. Goodrite Z.I.P. is also effective.

1619. Dumont, M.
Bienfaits et méfaits du raton laveur. **(Merits and demerits of the racoon.)**
Rev. d'Oka, 1955, **29**: 122-7.
The diet of *Procyon lotor lotor* includes a small proportion of top and soft fruits.

1620. Horsfall, F., Jr.
Rodenticidal effect on pine mice of endrin used as a ground spray.
Science, 1956, **123**: 61, bibl. 4.
Ground sprays of endrin applied to apple orchards during dormancy caused a rapid decline in pine mouse activity. Under moist soil conditions the sprays took longer to become effective than when the soil was dry. Little or no evident deleterious effect on men and game animals was apparent.—Va Polytech. Inst., Blacksburg.

Biological control.

1621. Marshall, J., and Morgan, C. V. G.
Notes on limitations of natural control of phytophagous insects and mites in a British Columbia orchard.
Canad. Ent., 1956, **88**: 1-5, bibl. 3.
A 3-acre experimental orchard of commercial varieties of apricot, sweet cherry, peach, pear, plum, prune and apple was planted in 1946 at Summerland. Since then, no insecticidal treatments have been given, and only peach trees have received fungicidal treatments. The apple crops were virtually destroyed by codling moth development, and foliage injury by the white apple leafhopper was also severe. Pear yields were reduced by up to 35%, due chiefly to attack by codling moth, pear psylla and eriophyid mites. In some seasons the mealy plum aphid caused about 25% loss of the Tilton apricot yield. Loss of plums from aphids averaged between 25% and 35%. The black cherry aphid caused complete loss of the cherry crop. Crop losses in peach due to pests were less than 10%.—Ent. Lab., Summerland, B.C.

Insecticides and fungicides.

(*See also* 1369-1371, 1640a, d, e, m-o, 2028.)

1622. Brown, A. W. A.
Survey of commercial application of agricultural chemicals in Canada.
Res. Notes Ser. Canada Dep. Agric. Sci. Serv., Ent. Div. **E-11,** 1956, pp. 45.
A survey was made of the extent to which crops are now treated with herbicides, insecticides and fungicides, and its relation to the acreage which could be profitably treated, of the degree to which chemical control operations are carried out by commercial spraying firms, and of the outlook for future commercial application in Canada.

1623. Dumas, P.
The effective use of modern pesticides and herbicides.
[*Publ.*] *O.E.E.C.*, 1955, pp. 76.
The training course at the National School of Agriculture, Grignon, in 1954, which is the subject of this

* Reprinted from *American Wild Life and Plants.*

report, was arranged by the Organisation for European Economic Cooperation to encourage the efficient use of the most appropriate chemical pesticides and herbicides, to promote effective cooperation between agriculturists and suppliers in the utilisation of these materials and to familiarise plant protection advisors with certain training techniques which have been found effective in agricultural education and extension. The report includes 10 papers by French and other authorities on various aspects of the subject.

1624. Society of Chemical Industry. (Members of Pesticides Group.)
Control of pests.
Reps. Progr. appl. Chem., 1954, **39**: 697-746, bibls.
Includes sections on fungicides, insecticides, nematocides, the use of insecticides of vegetable origin and trends in engineering in the control of pests.

1625. Warner, R. M.
Field tests on insecticides and fungicides on figs—1954.
Proc. 9th annu. Res. Conf. Calif. Fig Inst., 1955, pp. 38-41.
The chief results of tests on Calimyrna and Adriatic figs at various stations were: (1) A range of fungicides all reduced "external, non-removable rot" on Calimyrnas. (2) Dieldrin and heptachlor were the best of the insecticides tested against vinegar fly (*Drosophila* spp.) on both fig types and caused no off-flavour. Dieldrin and heptachlor residues were investigated.

1626. Beran, F., and Neururer, J.
Zur Kenntnis der Wirkung von Pflanzenschutzmitteln auf die Honigbiene (*Apis mellifica* L.). 1. Mitteilung: Bienengiftigkeit von Pflanzenschutzmitteln. **(A study of the effect of pesticides on honey bees. 1. Bee poisoning by pesticides.)** [English summary 1 p.]
PflSch. Ber. Wien, 1955, **15**: 97-147, bibl. 34, illus.
Toxicity tests with several pesticides were carried out on bees. Of the insecticides tested, all the phosphoric acid esters were highly toxic to bees; the chlorinated hydrocarbons were also very toxic. Systox, DDT and toxaphene were hardly toxic to bees. The fungicides dithane, fuclasin, nirit, pomarsol and lime-sulphur, and also the selective herbicides tested, were relatively non-toxic.

1627. Johnsen, P.
Systemic insecticides and bees.
Höfchen Briefe (English edition), 1955, **8**: 96-9, bibl. 8.
As a stomach poison, OMPA proved to be highly toxic to bees in comparison with other agricultural sprays. Nectar from plants of *Hosta japonica* and *Lilium regale* treated with 0·05% and 0·1% OMPA respectively was highly toxic to bees. Nectar extracted from *Fuchsia hybrida* 20 days after application of 0·05% systox was not toxic to bees. Bees were poisoned by nectar after applications of 0·5% systox. Pollen from hyacinth and fuchsia taken from plants treated wuth systox was not toxic to bees.—Danish Bee Res. Inst.

1628. Fjelddalen, J.
Systemic preparations against pests occurring on fruit trees, berries and ornamental plants.
Höfchen Briefe (English edition), 1955, **8**: 1-27, bibl. 22.
Notes are given on the absorption, translocation, mode of action and toxicity to man and animals of systox and schradan in tests on apples, plums, strawberries and ornamental plants.—Norwegian Institute of Pest Control, Oslo.

1629. Austin, M. D., and Linke, W.
Step forward in pest control.
Comm. Gr, 1956, No. 3137, pp. 277-9.
Metasystox was applied to fruit trees at the rate of 12 oz./100 gal. A spray applied to plum and apple trees in early June kept the trees relatively free from red spider [*Metatetranychus ulmi*] until well into August. A spray applied rather later than cot split to plums gave as good control of sawfly [*Hoplocampa* spp.] as did BHC, with an improved penetrative effect. A reduction of primary infestation and a prevention of secondary infestation of apple sawfly [*Hoplocampa testudinea*] was obtained by a spray applied 8 days after petal fall. Aphid control was also obtained on apples and hops with a metasystox spray.

1630. Swart-Füchtbauer, H.
The influence of systox upon micro-organisms.
Höfchen Briefe (English edition), 1955, **8**: 28-34, bibl. 7.
Tests led to the conclusion that in general the spraying of crops with systox is not harmful to soil micro-organisms.—Univ. Bonn.

1631. Metcalf, R. L., and others.
The nature and significance of systox residues in plant materials.
J. econ. Ent., 1955, **48**: 364-9, bibl. 8.
The metabolism of thiono and thiol isomers of systox in orange, apple and walnut was studied. Within 1–2 weeks of their application almost no trace of the original materials could be found in the plant tissues, and paper chromatographic techniques showed the presence of oxidative products. Air and sunlight on leaf residues also appeared to have a rapid oxidative effect. Investigations with radiotracer systox have shown that the average residue value at 2–4 weeks after application were much below 0·1 p.p.m., and were generally between 0·01 and 0·03 p.p.m. for orange juice, total apple peel and pulp, walnut meat and pear. —Univ. Calif. Citrus Exp. Stat., Riverside.

1632. Thomas, W. D. E., Bennett, S. H., and Lloyd-Jones, C. P.
The absorption, breakdown and systemic behaviour in plants of ^{32}P-labelled demeton-S.
Ann. appl. Biol., 1955, **43**: 569-93, bibl. 23, illus.
Investigations are described on the general behaviour

of diethyl-S-(2-ethylthioethyl) phosphorothiolate (demeton-S) labelled with ^{32}P after leaf application to beans, apples and *Coleus*; and to the roots of beans growing in soil or sand. [From authors' summary.]—Long Ashton Res. Stat.

1633. Fawcett, C. H., Spencer, D. M., and Wain, R. L.
Investigations on fungicides. I. Fungicidal and systemic fungicidal activity in certain aryloxyalkanecarboxylic acids.
Ann. appl. Biol., 1955, **43**: 553-68, bibl. 26.
Fifty-four aryloxyalkanecarboxylic acids have been examined as systemic fungicides. Of these, four which produced negligible damage in broad bean seedlings yet conferred systemic fungicidal protection to broad beans against *Botrytis fabae* and to tomatoes against *Alternaria solani* were studied in detail. [From authors' summary.]—Wye College.

1634. Hockey, J. F.
Timing of organic mercury fungicide applications.
Commonw. phytopath. News, 1956, **2**: 4-5.
In Nova Scotia apple orchards eradicant fungicides, namely some organic mercurials and dichlone, are rapidly replacing sulphur and lime for scab control. For some years excellent control has been obtained by applying organic mercurials in the post-infection periods, these being identified by the Mills' chart which shows the number of hours of continuous wetting necessary at various temperatures to permit infection. The first spray is applied immediately following the first infection period after the appearance of any susceptible new growth in the spring, and is considered to be effective for 7 days. The second spray is not applied until after a lapse of 7 days, and then only after a second infection period has occurred. Subsequent applications need be made only at 10-day or longer intervals. When no infection periods have intervened there have been intervals of 26 days between applications. On several occasions there have been infection periods within the 7-day interval mentioned, but no additional sprays were used nor were they found to be necessary. In other studies eradicants have given control when applied 112 hours after the start of an infection period. Phenyl mercury acetate has been the most popular of the organic mercurials, but phenyl mercury lactate and fixtan have been used to some extent. Dichlone has also been used in a post-infection schedule with good results when applied within 48 hours after the infection periods. It has been found necessary to change to a protectant for the applications subsequent to that made immediately after petal fall, in order to avoid russetting. Furthermore, organic mercurials are not recommended for the later sprays or for Cox, Dolgo Crab or the McIntosh group.—Plant Path. Lab., Kentville, N.S.

1635. van Blaricom, L. O., Foster, H. H., and Evans, C. D.
The effect of pesticides on the flavor of canned peaches.
Plant Dis. Reptr, 1955, **39**: 944-6, bibl. 12.
Some 2 dozen fungicides tested over 4 years with the following results: (1) Experimental fungicide Rohm and Haas CR-305 produced a marked off-flavour which was highly significant. (2) The sulfur-urea combination fungicide resulted in poorly flavoured peaches, but this was attributed to the delay in fruit maturation. (3) Captan-treated fruit had an off-flavour one year but this was attributed to the diluent or to impurities. (4) Other fungicides tested failed to produce significant off-flavour.—S.C. agric. Exp. Stat., Clemson.

1636. Clarke, G. M.
A design for testing several treatments under controlled environmental conditions.
Reprinted from *Appl. Statistics*, 1955, **4**: 199-206, bibl. 8.
Many writers have drawn attention to the limitations of the Graeco-Latin square design, which is able to remove four orthogonal sources of variation in an experiment, but in doing so reduces considerably the degrees of freedom available for the estimation of error. This article indicates how four such squares can be used together, provided certain conditions of orthogonality are satisfied, in a practicable and precise experimental design. The experiment described concerns fungicide assays in incubators.—Long Ashton Res. Stat.

1637. Splinter, W. E.
Deposition of aerial suspensions of pesticides.
Diss. Abstr., 1955, **15**: 1577-8, being *Publ.* 12957 of 180 pp.
A study was carried out on the efficiency of deposition and uniformity of coverage of plant surfaces by insecticides and fungicides. The specific phases investigated were the influence of particle sizes on the effectiveness of a pesticide, and the various forces affecting deposition and their relative importance in deposition. Of the forces considered, only those due to electrical field forces caused by particles charged in an ionized field were found to be of potential importance for effective deposition of fine particles.

1638. Palladini, G., and Martelli, G. P.
Prime prove di disinfestazione nel vuoto eseguite in Abruzzo con apparecchio mobile. **(Preliminary tests on a mobile vacuum-disinfestation apparatus in Abruzzo.)**
[English summary 11 lines.]
Ann. Sper. agrar., 1955, Vol. **9**, No. 6, Suppl. pp. XCV-CV, illus.
A description is given of a lorry-mounted vacuum-disinfestation unit which gave generally satisfactory results in preliminary trials on fruits, nuts, vegetables and a cactus plant using methyl bromide as fumigant. —Osserv. fitopat., Pescara.

1639. Delhaye, R.
Contribution à l'étude de l'application de peinture à base de pentachlorphénol, en serres à vignes. **(Contribution to the study of the use of PCP-based paints in vine glasshouses.)**
Parasitica, 1955, **11**: 132-3, illus.
Two instances are given of off-flavours and leaf abnormalities in Royal vines after the use of PCP-based paints in the glasshouse.—Stat. prov. Rech. sci. Vitic., La Hulpe.

Noted.

1640.

a ANON.
Literature published on systox.
Höfchen Briefe (English edition), 1955, **8**: 59-64.
Comprising 94 papers published since 1950 in Europe and North and South America.

b BENSON, N. R.
Boron deficiency.
Bett. Fruit, 1955, **50**(5): 7-8, illus.
Symptoms on apple, apricot, grapes and pears, and their correction.

c COLE, J. S.
Studies in the physiology of parasitism. XX. The pathogenicity of *Botrytis cinerea, Sclerotinia fructigena,* and *Sclerotinia laxa,* with special reference to the part played by pectolytic enzymes.
Ann. Bot. Lond., 1956, **20**: 15-38, bibl. 23.
Plant Path. Lab., Imp. Coll. Sci., Lond.

d COURSHEE, R. J.
How many gallons to the acre?
Grower, 1956, **45**: 338-40, illus.
A brief review of machines for medium and low volume spraying.

e CUNNINGHAM, G. H.
Certification of therapeutants.
Supplement to *Orchard. N.Z.*, 1955, **28**(1), pp. 4.

f DAVIS, J. R.
Frost protection with sprinkler irrigation.
Ext. Bull. Mich. St. Coll. **327**, 1955, pp. 12, illus.
Information on installation and use.

g EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANIZATION.
Field rodents in Europe, 1953-1954. [English and French.]
[*Publ.*] *Eur. Med. Plant Prot. Org.*, 1955, pp. 13 and XII and appendix pp. 3.
Incidence, injuries and control.

h FORESTRY COMMISSION, LONDON.
Traps for grey squirrels.
[*Publ.*] *For. Commiss. Lond.*, revised 1955, pp. 10, illus.

i GOHEEN, A. C., AND BRAUN, A. J.
Some parasitic nematodes associated with blueberry roots.
Plant Dis. Reptr, 1955, **39**: 908.

j JENNY, J.
Quelques installations de fumigation pour la lutte contre le pou de San-José. **(Some fumigating apparatus for controlling San José scale.)** [German, English and Italian summaries.]
Landw. Jb. Schweiz, 1955, **4**: 865-9, illus.
Swiss apparatus for fruit tree fumigation.

k LATHROP, F. H.
Apple insects in Maine.
Bull. Me agric. Exp. Stat. **540**, 1955, pp. 88, bibl. 58, illus.
Fourteen important pests: their injuries, life and seasonal cycles and control.

l MINISTRY OF AGRICULTURE, LONDON.
Brown rot and allied diseases of plum.
Adv. Leafl. Minist. Agric. Lond. **248**, amended 1955, pp. 4, illus.
Sclerotinia fructigena and *S. laxa.*

m PHILLIPS, M. A.
The fluoroacetate series of pesticides.
World Crops, 1955, **7**: 480-2, bibl. 12, illus.
Rodenticides and insecticides.

n PROSSER, D. S., JR., AND STEARNS, C. R., JR.
Safety devices for use with parathion containers.
Circ. Fla agric. Exp. Stat. **S-66**, 1954, pp. 8, illus.

o SCHILLING, R. S. F.
Toxicological hazards.
Reps. Progr. appl. Chem., 1954, **39**: 910-20, bibl. 60.
Including a brief section on those from insecticides and weed killers.

p SEMAL, J.
Le rôle des insectes dans la transmission des virus attaquant les cultures fruitières. **(The role of insects in the transmission of fruit viruses.)**
Fruit belge, 1956, **23**: 161-4, bibl. 22.
Known vectors are listed.

q TAYLOR, A., AND RIDPATH, M. G.
Bird damage and the fruit grower.
Fruit Year Book 1956, pp. 73-7, bibl. 5.
A review of deterrent methods which have been tested.

r VENEROSO, A.
Allevamenti di bachi da seta decimati per somministrazione di foglia di gelso resa velenosa da fluoruri. **(Silkworm colonies decimated by feeding on mulberry leaves rendered toxic by fluorides.)** [English summary ½ p.]
Ann. Sper. agrar., 1955, **9**: 1445-52, bibl. 3.

s WOLFE, H. R.
Relation of leafhopper nymphs to the western X-disease virus.
J. econ. Ent., 1955, **48**: 588-90, bibl. 7.
Serious in peach and cherry. [See also *H.A.*, 25: 2735e.]

t ZECK, E. H.
The grape-vine moth, *Phalaenoides glycine.*
Agric. Gaz. N.S.W., 1955, **66**: 552, illus.
Biology, Australian host plants and control with DDT or lead arsenate.

WEEDS AND WEED CONTROL.

General.

(*See also* 1675c.)

1641. National Weed Committee, Western Section.
Weed control recommendations for 1956.
[*Publ.*] *Canad. Dep. Agric., Ottawa*, [1955], pp. 25.

These recommendations are intended particularly for the information of research workers. The subjects covered include the control of 10 perennial and 4 annual weeds and of aquatic and of woody plants, weed control in 8 vegetable and 5 small fruit crops including grape vines, in bulbs and in lawns, the response of weeds and woody plants to 2,4-D and MCP, and soil sterilization.

Particular weeds.

(*See also* 1675f.)

1642. Watt, A. S.
Bracken versus heather, a study in plant sociology.
J. Ecol., 1955, **43**: 490-506, bibl. 13.

An account of the interaction of *Pteridium aquilinum* and *Calluna vulgaris* at Lakenheath Warren on a podsolized sand in an area liable to much frost. Each is gradually replacing the other on different parts of the area; the reasons and phenomena involved are discussed.

1643. Fail, H.
The effect of rotary cultivation on the rhizomatous weeds.
J. agric. Engng Res., 1956, **1**(1): 68-80, bibl. 14, illus.

In experiments on various soils in Northumberland periodical rotary cultivation completely eradicated couch (*Agropyron repens*), twitch (*Agrostis* spp.) and bracken.—King's Coll., Newcastle.

1644. McNulty, I. B., and Rhodes, E. A.
The use of arsenicals for the control of crabgrass.
Proc. Utah Acad. Sci., 1954-1955, **32**: 125-30, bibl. 5.

Experimental plots of turf infested with crabgrass (*Digitaria sanguinalis*) were treated with different concentrations of lead arsenate, arsenic trioxide and calcium arsenate as pre-emergent herbicides. In general lead arsenate was the most effective, and more than 95% control was obtained at rates of 10, 11 and 15 lbs./1,000 sq. ft. Autumn and early spring applications were more successful than summer ones.

1645. Brod, G.
Studien über *Cercospora mercurialis* Passer in Hinblick auf eine biologische Bekämpfung des Schutt-Bingelkrautes (*Mercurialis annua* L.). **(Studies on *Cercospora mercurialis* with regard to biological control of annual mercury.)**
Phytopath. Z., 1955, **24**: 431-42, bibl. 14, illus.

Cercospora mercurialis was not considered suitable for biological control of mercury owing to the vigour of the weed and the long incubation period of the fungus.

1646. Rao, P. G.
A rapid method for studying the germination of the seeds of the root parasite *Orobanche cernua* Loefl. var. *desertorum* (Beck.).
Sci. and Cult., 1955, **21**: 258-62, bibl. 6, illus.

Orobanche cernua var. *desertorum* is a common parasite of tobacco and other crops in southern India. Trials indicate that its seeds germinate without contact with the host provided the root stimulus is available to them, either through the soil or in solution with water or nutrient solution. Most of the crops which are normally rotated with tobacco and some weeds are able to stimulate germination of Orobanche seeds. The germination percentages obtained from the root stimulus of 35 plant species are tabulated.—Agric. Coll., Bapatla.

Control of aquatic weeds.

(*See also* 1675e.)

1647. Ahmad, N.
On water-hyacinth and its control in fish ponds.
Agric. Pakistan, 1955, **6**: 34-8, bibl. 3, illus.

Experiments in East Pakistan showed that herbicides are effective for the control of *Eichhornia speciosa*, but unnecessary, since control by manual labour is cheap and effective. The plants should be removed between mid-June and the end of August. At this season they are free-floating and have not yet begun to seed.

Control of woody plants.

1648. Naude, T. J.
Biological control of prickly pear.
Fmg S. Afr., 1955, **30**: 493-4, 523, illus.

A brief account is given of the successful control, except in the Karoo and a coastal belt, of *Opuntia megacantha* by *Cactoblastis cactorum* which destroys small trees only, and by the cochineal insect, *Dactylopius opuntiae*. It is emphasized that biological control by itself cannot effect complete eradication and that a certain amount of felling is required. [See also *H.A.*, 25: 3817.]

1649. Dingwall, A. R.
Sweet brier control.
N.Z. J. Agric., 1955, **91**: 559, illus.

Sprays of 2,4-D proved to be relatively ineffective against *Rosa eglanteria*. Both the butyl and butoxy ethanol esters of 2,4,5-T gave better results than the polyethylene glycol ester, and have proved to be moderately efficient when applied as cover sprays to well established bushes. Very satisfactory results have been obtained with basal sprays of 2,4,5-T esters in diesel fuel during dormancy. Good control was also obtained when regrowth on cut stumps was sprayed with 2,4,5-T esters, provided sheep were allowed to graze the treated shoots. CMU and PMU both showed promise.

Weed control in fruit crops.

1650. Michigan State College, Department of Horticulture.
Chemical weed control in small fruits and orchards.
Ext. Folder Mich. St. Coll. **F-190**, 1955, 1 folded sheet.
In strawberries, raspberries, grapes, blueberries, currants, gooseberries and tree fruits.

1651. Lee, W. O., and Timmons, F. L.
You can now control chokecherry growing near foothill fruit orchards.
Fm and Home Sci., 1955, **16**: 46-8, 61-2, illus.
Experiments show that chokecherry (*Prunus virginiana*), an important carrier of the western X-disease of stone fruits, can be killed by repeated foliage spray applications of low-volatile esters of 2,4-D or mixtures of 2,4-D and 2,4,5-T at a concentration of 0·2% by weight in water. Treatments made each year at the full leaf and blossom stage early in June can be expected to kill 90% of the trees in 2 years and eventually to give complete eradication. Basal applications to a height of 15 in. from the ground of a low-volatile ester of 2,4,5-T at 2·0% acid equivalent by weight in diesel oil applied in early spring killed all trees after two treatments in two years.

1652. Karnatz, H.
Über die Wirkung des Unkrautbekämpfungs-Hormons U 46 auf Obstgehölze. **(The effect of the selective herbicide U-46 on fruit trees.)**
Mitt. ObstbVersuchsringes Jork, 1955, **10**: 281-3, illus.
Summer growth of young pear trees, variety Köstliche von Charneu, was seriously reduced by drift from a herbicidal spray. Young trees of Neue Poiteau, however, developed normally after the initial damage. Mature trees of the cherry Bremens Kirsche also showed considerable spray damage.

1653. Brooks, A. N.
Weed control in strawberries.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 111-13.
Applications of 2 and 4 lb. of Crag Herbicide per acre were applied to nursery beds of strawberries. The lower rate did not noticeably affect growth of well-rooted plants, but such plants were stunted by the higher rate. Runner plants did not become established in treated soil. Hoeing and weeding times were reduced by 40% in treated beds. Applications at 2 lb. per acre to fruiting plants reduced weed counts, 16 days after application, from 17·6 to 2·3 per sq. ft. Plant growth was slightly reduced and significantly less fruit was obtained. When used as a preplanting treatment good weed control was obtained; on a light soil plant mortality was higher as a result of this treatment than on a heavier soil.—Strawberry Field Lab., Plant City.

Weed control in ornamentals.

1654. McFaul, J. A.
Weeds controlled in azalea and pansy plantings with Dowfume MC-2.
Down to Earth, 1955, **11**(3): 15-16, illus.
Methyl bromide at 1½ lb./sq. ft. injected under a gas-proof cover just before sowing pansies or lining-out azaleas gave very effective weed control. The soil temperature was above 60° F.; a medium soil moisture content is desirable.

1655. Day, B. E., and Russell, R. C.
Chemical weed control in rose nursery fields.
Hilgardia, 1955, **23**: 597-612, bibl. 4, illus.
Rose cuttings were planted in late December and early January. Four to five weeks after planting, CMU, DCMU, SES, CIPC, IPC and alanap were applied. CMU and DCMU controlled all weeds, but the 2 phenylcarbamates showed only limited effectiveness. Alanap controlled the weeds but caused serious injury to the roses. Treatments of CMU and DCMU applied in April proved to be equally toxic to the weeds and roses, while 3 phenylcarbamates applied then gave excellent weed control without damaging the roses. Later in the season contact sprays were applied to weed growth and rose stems without wetting the foliage. Various mixtures of relatively non-toxic kerosene with an aromatic oil and with dinitro butylphenol were tested. All formulations effective against weeds were more or less toxic to the roses. The kerosene-dinitro formulations were rather more selective than the oil mixtures. Emulsions of dinitrobutylphenol applied in the same way killed all weeds except grasses and knotweed. Endothal controlled all weeds except *Chenopodium* spp. Rose stems were resistant to a wide range of concentrations of both materials.—Citrus Exp. Stat., Riverside, Calif. [See also *H.A.*, 25: 1579.]

Weed control in tropical crops.

1656. Tanganyika.
***Progress Report Colonial Insecticide Research, Arusha,* 17,** April–September 1955, pp. 13.
Section VI gives an account of experiments on the control of a number of indigenous trees and of *Solanum incanum*, mainly with 2,4-D and 2,4,5-T.

1657. Mapother, H. R.
Arboricides.
A.R. W. Afr. Cocoa Res. Inst. 1954/55, 1955, pp. 88-9.
Twelve arboricides were tested against large specimens of *Ceiba pentandra* and *Cola cordifolia*, which are alternative hosts of the swollen shoot disease. The active principles included sodium arsenite, ammonium sulphamate, high aromatic oil, sodium chlorate, PCP and esters of 2,4-D and 2,4,5-T. All killed *Ceiba*, but some *Cola* trees survived all the active principles except high aromatic oil and the esters of 2,4,5-T. The trees took 1–3 years to die. They generally disintegrated slowly, thus causing comparatively little damage to cacao growing beneath them.

1658. Hawaiian Sugar Planters' Association.
Weed control.
A.R. Hawaiian Sugar Plant Ass. Exp. Stat. 1954/55, pp. 54-62, illus.
The following were among investigations made. In tests on a number of grasses including *Panicum* spp.,

crabgrass and kikuyu grass Dalapon proved more effective than TCA. The range of effective per-acre dosages varied from about 1 lb. Dalapon to from 4 to 8 lb. TCA. Combinations of the two chemicals have been highly effective on torpedo grass but have not proved valuable for other grasses. Current tests with amino triazole indicate that it is quite effective in combination with Dalapon. In tests on CMU and DCMU (1) the effect of CMU on cane was appreciably greater than that of DCMU on low-humic latosols and on alluvial and grey hydromorphic soils, but it was concluded that damage is unlikely when either is properly applied; (2) the 2 herbicides gave the longest and most consistent periods of control on humic and hydrol humic latosols, DCMU almost always giving equal or appreciably longer control, weight for weight, than CMU; (3) in general, neither of the 2 herbicides gave longer control when applied in CADE than in water. 2,4-D was the most effective of several chemicals tested against *Tribulus cistoides*, 2 treatments of 5 lb. per acre being satisfactory. Investigations on the effect of 2,4-D, 2,4,5-T and silvex on macadamia have shown: (1) Terminal growth may be stopped when concentrated droplets strike new flushing growth. (2) Varied leaf symptoms, from dead spots to distortions and chlorotic venation, may result from concentrated droplets on leaves. (3) Nut set is apparently affected when 2,4-D comes in contact with young racemes that are in the flowering-to-young-nut stage.

1659. Hanson, N. S.
Forms of substituted urea as herbicides for controlling weeds on sugar cane lands of Hawaii.
Diss. Abstr., 1955, **15**: 1287, being *Publ.* 12750 of 90 pp.

Three substituted urea chemicals, namely PMU, CMU and DCMU, were evaluated in laboratory and field experiments on irrigated and non-irrigated soils. Soil type affected differential movement, toxicity and disappearance of CMU and DCMU. The greatest damage from CMU and DCMU toxicity was observed on low-humic latosol soils. In the soils studied CMU disappeared more rapidly than DCMU, and gave shorter pre-emergence control of weeds. In field experiments longer periods of pre-emergence control were obtained in areas of relatively high rainfall, adequate moisture in the surface soil being necessary for maximum effect. In two tests no reduction in sugar cane yield was observed from applications of 20 lbs. CMU per acre; in a third test yield reductions were found at levels above 10 lbs. per acre. Germination was not affected by CMU at rates of up to 32 lbs. per acre applied to soil covering the seed pieces. All 3 herbicides were shown to be effective in treating roadsides and other non-agricultural areas, as well as for pre-emergence control of weeds in sugar cane plantations.

1660. Guzman, V. L.
Herbicidal control of weeds in sugar cane growing in muck soil.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 114-21, bibl. 5.

The use of herbicidal mixtures was compared with mechanical cultivation of sugar cane in a commercial-size experiment. The best control of weeds, predominantly Alexander grass (*Brachiaria plantaginea*), was obtained by mechanical cultivation. The plot treated with CMU plus TCA was the cleanest of the herbicide-treated plots, but the TCA and 2,4-D mixture also gave commercial control. In most cases yields from herbicide-treated plots were higher than those from the cultivated plots.—Everglades Exp. Stat., Belle Glade.

1661. Ennis, W. B., Jr.
Weed control in principal crops of the southern United States.
Advanc. Agron., 1955, **7**: 251-97, bibl. 111.

Sections are devoted to the problem in sugar cane (3 pp.) and in tobacco (2 pp.). The use of 2,4-D and that of 2,4-D+TCA supported by appropriate cultivation have been the chief control measures in sugar cane. Other herbicides which have shown promise are preemergence CMU and CIPC, and 2,2-dichloropropionic acid has proved better than TCA as a foliage spray on Johnson grass. In tobacco plant beds methyl bromide has proved very successful. Post-transplanting treatments with sodium 2,4,5-trichlorophenoxyethyl sulphate, 2,4-dichlorophenoxyethyl benzoate dichloral urea and other similar materials show promise.

1662. Skinner, J. C.
Control of nut grass by maleic hydrazide.
Cane Grs' quart. Bull., 1956, **19**: 107-8, bibl. 6, illus.

In a small experiment at the Northern Sugar Experiment Station, Queensland, dense nutgrass (*Cyperus rotundus*) about 12 in. high was sprayed once on 1st April 1955 with 1·6% aqueous solution of the Na salt of MH at 156 gal. per acre (equivalent to 25 lb. per acre). Six days later the sprayed and the control plot were hoed to destroy the tops. After a month the control carried a dense stand of nutgrass and the sprayed plot only a few stunted plants. After 2 months the sprayed plot contained a dense stand of annual weeds. Both plots were again thoroughly hoed in June. At the end of September the sprayed plot contained much less nutgrass than the control.

1663. Buzacott, J. H.
Maleic hydrazide [for nutgrass control].
A.R. Qd Bur. Sugar Exp. Stats 1954/55, 1955, pp. 49-50, illus.

Spraying with MH [at an unspecified concentration] gave excellent control of *Cyperus rotundus* for the duration of the experiment at the time of reporting, namely, 16 weeks.

1664. Day, B. E., and Russell, R. C.
The effect of drying on survival of nutgrass tubers.
Bull. Calif. agric. Exp. Stat. **751**, 1955, bibl. 9, illus.

Tubers of purple and yellow nutgrass (*Cyperus* spp.) were exposed to dry soil and air conditions in the laboratory and in the field. Purple nutgrass tubers were readily killed by drying in open air and by deep ploughing in dry soil. Yellow nutgrass tubers survived prolonged storage in dry air.

Weed control in vegetables.

(*See also* 1675a.)

1665. Guzman, V. L., and Wolf, E. A.
Weed control investigations in vegetable crops.
A.R. Fla agric. Exp. Stats, 1954, pp. 228-32, illus.

Results are reported of tests with various herbicides in crops of cabbage, beans, lettuce, spinach, carrots, endive, onions, peppers and celery.

1666. Danielson, L. L.
Granular herbicides for vegetable crops.
Market Grs' J., 1955, **84**(10): 12, 19, illus.

In field trials with transplanted vegetables crops granular forms of herbicides applied after the final cultivation and a hand hoeing gave promising weed control. There was an indication that higher rates of herbicides could be used in a granular form than as a spray without causing crop injury. The possibility of weed control by granular herbicides for other crops is discussed.—Virginia Truck Exp. Stat. [See also *H.A.*, 25: 1596 and 26: 489.]

1667. Hamner, C. L., and Rai, G. S.
Paper mulch controls weeds.
Amer. Veg. Gr, 1955, **3**(6): 19, illus.

The use of soaked and then shredded newspaper spread as a mulch over a radius of 12 inches round each plant resulted in good growth and weed-free plots of tomato and cabbage. [See also *H.A.*, 25: 419.]

1668. Anon.
Asparagus still healthy after double dosages of weed killer.
Agric. Newsl., 1955, **23**: 108, illus.

Applications over 5 years of 4 lb. per acre of Karmex W (a substituted urea compound) made in both April and June have not affected growth of asparagus, and have effectively controlled weeds.—Univ. Del. exp. Stat., Georgetown.

1669. Roberts, H. A.
CMU tests with asparagus promise well.
Grower, 1955, **44**: 1349-51, illus.

In tests at Wellesbourne established asparagus beds were sprayed with 2 and 4 lb. of CMU in 100 gallons of water per acre of bed. Both rates killed more than 90% of the chief weed, annual nettle, but no yield data were obtained. In seed-bed treatment CMU applied about a week after sowing showed excellent weed control at all rates 5 weeks later. No adverse effect on stand or height of primary shoot was obtained at rates up to 1 lb. per acre. On a sandy loam radishes were used as a test plant on CMU-treated plots 1 year after application. Initial treatments with 2 lb. per acre did not affect radish growth but after 4 lb. applications growth was severely affected.

1670. Pastac, I. A.
Problème du désherbage: destruction des mauvaises herbes dans les champs de carottes. **(A weed control problem: the destruction of weeds in carrots.)**
Reprinted from *C.R. XXVII^e Congr. int. Chim. industr.*, 1954, Brussels, pp. 4.

In recent tests 80 kg. emulsifiable coal tar oil in 800–1,000 l. water per ha. has given good weed control in carrot crops. Notes are given on its degree of control of various weeds. It should be applied when the carrots have 3–4 true leaves. It can be used at any season, but in hot weather the treatment should be given in the morning or evening. It can also be used in liliaceous and in some other umbelliferous crops.—Labs G. Truffaut, Versailles.

1671. Minshall, W. H.
Translocation path and place of action of 3-(4-chlorophenyl)-1:1-dimethylurea in bean and tomato.
Canad. J. Bot., 1954, **32**: 795-8, bibl. 3, illus.

A graded concentration series of CMU in water produced similar effects on intact plants and on excised tops of tomato and kidney bean. When applied to roots CMU had ready access to the vascular system and was quickly carried in the xylem to the tops. Lethal concentrations of CMU killed leaf tissues. As the roots of treated plants lived for some days after the leaves were killed, the foremost toxic action of CMU must have taken place in the leaves. [From author's abstract.]—Sci. Serv. Lab., London, Ontario.

1672. Krüger, —.
Application of "Bulpur" on onions, 1954.
Höfchen Briefe (English edition), 1955, **8**: 110-12, illus.

A pre-emergence spray of 2% Bulpur gave effective control of weeds in onion rows. Post-emergence sprays of 1½% and 2% were applied in early June when the onions were about 15 cm. high, when the weeds had reached and some had passed the large rosette stage. Fumitory and orache were very resistant to the spray, but good control was obtained of persicaria and creeping thistle.

Herbicides and apparatus.

(*See also* 1640o, 1675d.)

1673. Swezey, A. W.
Baron presents low drift hazard.
Down to Earth, 1955, **11**(3): 10-11, illus.

Baron is an emulsifiable formulation containing erbon (2(2,4,5-trichlorophenoxy)-ethyl 2,2-dichloropropionate). It is a non-selective herbicide, acting systemically. Laboratory experiments have shown that erbon was much less toxic to tomato plants than 2,4,5-T, and was less active in cooler weather. In field experiments, only slight drift damage occurred.—Dow Chem. Co., Seal Beach, Calif.

1674. Ciferri, O.
Prove circa il lavaggio di recipienti e pompe contaminati con il 2,4-D. **(Tests on cleaning containers and pumps contaminated with 2,4-D.)**
Not. Mal. Piante, 1956, No. 34, pp. 3-11, bibl. 3.

The chief results and conclusions were: (1) The use of wooden containers is inadvisable. (2) Traces of the sodium salt and the ethyl ester can be removed by 2 washings in boiling 2·5% sodium hydroxide followed by at least 2 washings in hot or cold water. (3) Two washings with paraffin or naphtha followed by one or more rinsings with water are required for the effective removal of traces of the cyclohexamine and other similar salts.—Lab. crit. Ital. and Ist. bot. Univ. Pavia.

Noted.

1675.

a ANON.
Chemical weed control in vegetable crops.
Ext. Folder Mich. St. Coll. coop. Ext. Serv. **F-193**, 1955, 1 folded sheet.

b DANIEL, W. H.
***Poa annua* controls with arsenic materials.**
Golf Course Reptr, 1955, **23**(1): 5-8, from abstr. in *Biol. Abstr., Sect. D*, 1956, **30**, No. 5860.

c ENNIS, W. B., JR.
Some soil and weather factors influencing usage of pre-emergence herbicides.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 130-9, bibl. 19.
A review.

d HENRIET, J.
Contribution à l'analyse des produits phytopharmaceutiques. VI. Dosage de l'acide 2-méthyl-4-chlorophénoxyacétique par chromato-spectrophotométrie. **(Analysis of phytopharmaceutical products. VI. Determination of 2-methyl-4-chloro-phenoxyacetic acid by chromato-spectrophotometry.)**
Parasitica, 1955, **11**: 81-102, bibl. 14.
In selective herbicides based on MCPA.

e SAXBY, S. H.
Water hyacinth must be exterminated.
N.Z. J. Agric., 1955, **91**: 449-52, illus.
Its effects and control.

f WESTMORELAND, W. G.
Some weedy plants of North Carolina.
Ext. Circ. N.C. agric. Ext. Serv. **390**, 1955, pp. 58, illus.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 1292, 1294, 1314, 1350, 1355-1359, 1455, 1456, 1665-1667, 1837b, j, v, y, z, 1954h, 2153, 2322.)

1676. REICHART, N. A. R., AND OTHERS.
Crónica de la Segunda Reunión Técnica de Horticultura. **(Report on the Second Technical Conference on Vegetable growing.)**
Idia, 1955, No. 89, pp. 1-40, illus.
This issue of Idia is devoted entirely to the Second Technical Conference on Vegetable growing which took place at the National Centre of Agriculture at Castelar, Argentina, in April 1955 and to the 11 papers presented thereat. The papers cover the following subjects: production, seed, diseases, varieties, soils, fertilizers, irrigation, breeding, mechanization, processing, storage, marketing and exports.

1677. BRITTINGHAM, W. H.
The vegetable areas of America. Eastern Virginia.
Amer. Veg. Gr, 1955, **3**(7): 10-11, 13, illus.
The greatest concentration of vegetable growing is in the eastern counties, and the trade is favoured by the nearness of large cities in the North. Among the many crops grown, tomatoes, snap beans and strawberries are the most important.

1678. TALBOTT, G.
The vegetable areas of America. Florida.
Amer. Veg. Gr, 1955, **3**(2): 14-15, 23, illus.
Most of the vegetables grown in Florida are consumed fresh and supply the nation's market in late autumn, winter and early spring.

1679. CHAKRAVARTY, H. L.
Introduction of food and vegetable plants in India.
Sci. and Cult., 1955, **21**: 242-5, bibl. 10.
Forty vegetables, nuts and temperate and subtropical fruits are suggested for introduction.

1680. THE ROYAL AGRICULTURAL SOCIETY OF DENMARK.
Prominent Danish Varieties and Strains of Agricultural and Horticultural Plants, 1955, Seed Committee, Royal Agricultural Society of Denmark, 1955, pp. 16, illus.
Vegetable varieties include specimens of red and white cabbage, cauliflower, sprouts, spinach, carrots, radishes and scorzonera.

1681. GREENSILL, T. M.
The application of commercial methods of vegetable growing in the Eastern Region of Nigeria.
Trop. Agriculture Trin., 1956, **33**: 18-34, bibl. 5.
In 1950 the Department of Agriculture, Eastern Region, initiated the Pilot Urban Market Garden Scheme at Enugu to investigate problems of commercial vegetable growing in the larger towns, using night-soil compost to maintain soil fertility under conditions of continuous cropping. A very wide range of vegetables has been tested under commercial conditions and already valuable information has been obtained concerning the most suitable varieties. Preliminary notes are given on pests, diseases and nutritional disorders.

1682. INTERNATIONAL SEED TESTING ASSOCIATION.
International rules for seed testing.
Proc. int. Seed Test. Ass., 1953, **18**(1), pp. 69.
The International Rules for Seed Testing herein described were adopted at a meeting in Dublin in May 1953 and were to come into force on January 1st, 1954, for the Southern Hemisphere and on July 1st, 1954, for the Northern Hemisphere. They apply to agricultural and vegetable seeds including grasses, and to tree seeds. They cover sampling, purity analysis, determination of content of noxious weed seeds, testing for germination, for diseases and pests, for genuineness and for moisture

content, ultra-violet test for *Lolium*, determination of provenance, weight determination and tolerances.

1683. Mukherji, D. K.
Seed testing. X. Investigations on tetrazolium salt as a rapid germination tester for seeds of agricultural and vegetable crops.
Sci. and Cult., 1956, **21**: 390-1, bibl. 6.
In investigations on the seeds of 10 vegetables including chillies at the State Agricultural Research Institute, Calcutta, a tetrazolium viability test lasting in most cases about 24 hours was found to agree well with the usual germination test lasting 7–30 days.

1684. Anon.
The preservation of viability and vigor in vegetable seed.
Asgrow Monogr. **2**, 1954, pp. 32, bibl. 42, illus.
Cucumber, onion, pepper and tomato seeds were packed in several ways and stored at different moisture levels at 60–100° F. for 3 months to 9 years. Detailed results are given. A summary is as follows: (1) With canned cucumber seed viability and seedling vigour did not change significantly in 36 months when the moisture content was 5·3% or less and the storage temperature was 90° F. or less. (2) With canned onion seed viability and vigour remained excellent at a moisture content of 6·3% or less at 90° F. for 36 months. Onion seed stored in a desiccator at an average moisture content of 1·2% retained its viability for 9 years without serious loss despite temperature fluctuations during the warmer seasons. Onion seed stored in kraft envelopes was almost worthless after 2 years. Storage in paper cartons was not so satisfactory as in cans. (3) To maintain viability and vigour for at least 3 years canned pepper seed must not have over 4% moisture content if the storage temperature is as high as 90° F. (4) Canned tomato seed retains excellent viability and vigour for 36 months provided the moisture level is held at 5·9% or less, even if the storage temperature is maintained at 90° F. The principal general conclusions were: (1) Moisture content is a predominant factor in longevity of vegetable seeds. (2) At a given moisture content, viability and vigour decreased more rapidly, the higher the temperature within the range of 60° F. to 100° F. (3) Seedling vigour showed an earlier and more rapid decline than viability or the mere ability to germinate. A fall in germination percentage or viability followed such declines in vigour under the conditions of the experiments.—Ass. Seed Grs Inc., New Haven.

1685. Natti, J. J., and Schroeder, W. T.
Protectant seed treatments for vegetable processing crops.
Bull. N.Y. St. agric. Exp. Stat. **771**, 1955, pp. 46, bibl. 1, illus.
Seed treatment tests conducted during the past 11 years have shown the desirability of protecting seeds of dry bean, lima bean, snap bean, beet, carrot, crucifers, cucurbits, pea, pepper, spinach, sweet corn and tomato from decay and the seedlings of some of these crops from pre-emergence damping off. Various fungicide-insecticide combination treatments, applied either as dusts or slurries, were tested under a wide range of environmental conditions and found effective on seeds of dry bean, lima bean, snap bean, pea and sweet corn. Improved treatments are discussed.

1686. de Oliveira, M. A.
Tratamento de sementes de espécies olerícolas com fungicidas para cultivos sob condições de campo. **(Field trials on the fungicidal treatment of vegetable seeds.)** [English summary ½ p.]
Bol. téc. Inst. agron. Sul, Pelotas **11**, 1954, pp. 23, bibl. 17.
A number of fungicidal seed dressings were tested on cabbage, broccoli, cauliflower, mustard, tomatoes and peas under various conditions of temperature and relative humidity in 1949/53. The results were: (1) With crucifers arasan, semesan and spergon gave the best results; they were most efficacious under conditions of moderate temperature and high humidity in the autumn and winter. (2) With tomatoes seed dressings had no effect in warm weather but some were effective in cool weather at the end of the winter, the best being a 90-minute dip in 1·6% copper sulphate (3) With peas treatment improved stand but not yield

1687. David, W. A. L., and Gardiner, B. O. C.
The aphicidal action of some systemic insecticides applied to seeds.
Ann. appl. Biol., 1955, **43**: 594-614, bibl. 8.
When large seeds such as broad bean are soaked in certain systemic insecticides, notably demeton, the plants which they produce are toxic to aphids. With small seeds the effect is difficult to detect. An account is given of preliminary tests with schradan, dimefox, paraoxon and sodium fluoroacetate for cabbage seed, french beans and broad beans and of a more detailed experiment with demeton for broad beans.—Agric. Res. Counc., Unit Insect. Physiol., Cambridge.

1688. LeCompte, S. B., Jr.
The art of irrigating vegetables.
N.J. Agric., 1955, **37**(4): 11-12, 16, illus.
Since 1948, yield, quality and growth of sweet corn, broccoli, spinach, peppers and bunch onions have been measured. Evaporation meters were used to measure the drying effect of air on the crop, and soil moisture conditions were measured by a direct current gypsum block moisture detector. A practical system for timing irrigation, using either of these instruments, has been developed. In irrigated areas there was no sunscald or blossom end rot in World Beater No. 13 sweet pepper. It was found that short showers of rain, supplying about 1 inch, soaked less than 6 inches into dry cropped soil.—Veg. Res. Farm, New Brunswick.

1689. Anderson, O. E.
Effects of anhydrous ammonia on some soils and crops of New Jersey.
Diss. Abstr., 1955, **15**: 1691, being *Publ.* 14027 of 120 pp.
A significant response to NH_3 was obtained in one of two cabbage tests, and in one beet and one lettuce test. The average yields obtained after side-dressing plots of carrots and cucumbers with N were larger than those from plots which did not receive a side-dressing.

1690. KEINER, W.
Untersuchungen über den Einfluss von Spurenelementen auf Ertrag und Qualität einiger Gemüsearten. **(Experiments on the effect of minor elements on yield and quality of some vegetables.)** [Russian, English and French summaries.]
Kühn-Arch., 1955, **69**: 223-82, bibl. 51.

The minor elements B (as H_3BO_3), Cu ($CuSO_4$), Mn ($MnSO_4$), Br (KBr), Zn ($ZnSO_4$) and F (NaF) were supplied to brassicas, tomatoes, carrots and celeriac in studies of their effect on yield and quality. Applications were made to field plots, to seedlings in seed beds, as pre-sowing treatments and by underground irrigation. Seed treatment had a much more favourable effect on yield than applications to field plots or seed beds. Both yield and quality were improved by supplying B, Cu and Mn in underground irrigation water. Several rates of minor element supply increased dry matter content and Mg, Fe and P contents in the ash. In seedlings from seeds, which had been treated with combined applications of B, Cu and Mn, CO_2-assimilation was much increased and transpiration was decreased.

1691. MULDER, E. G.
De betekenis van molybdeen als sporenelement in het bijzonder in verband met de stikstofvoeding van land en tuinbouwgewassen. **(The importance of molybdenum as a trace element, particularly in relation to nitrogen nutrition of agricultural and horticultural crops.)**
Reprinted from *Stikstof*, 1954, No. 3, pp. 85-96, illus.

Crops which are very sensitive to Mo deficiency are cauliflower, white cabbage, spinach, lettuce and tomatoes. Symptoms observed in these plants when growing in Fe-containing sand and peat soils are described. Peas and beans grown from market seed on Mo-deficient soils showed only slight Mo-deficiency symptoms. When seed was taken from plants growing in such soils, severe Mo-deficiency symptoms were observed in the resultant plants. Mo plays a role in the conversion of nitrates to organic N compounds.

1692. ROBERTS, E. C.
Responses of plants to sodium applications.
Diss. Abstr., 1955, **15**: 1696-7, being *Publ.* 14053 of 172 pp.

Sodium was applied in nutrient solutions and under field conditions to several crop plants. Sodium was of greatest value to beet plants, where it seemed to have the effect of stimulating the maintenance of high moisture content. Pepper showed yield increases in sand culture where Na was applied. Yield increases with tomato were much greater in sand culture than in the field. In soil culture, where Na was substituted for most of the K in a standard 60% K_2O fertilizer, yields of tomato, cabbage, lettuce and carrot were not maintained. A low O_2 level in the root zone was found to result in increased Na accumulation in plant tissues.

1693. WESTGATE, P. J.
Minor element response of vegetables at Sanford: a review.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 24-6, bibl. 10.

Truck crops on a fine sand responded to boron and chelated iron (Fe-EDTA) as foliar sprays or soil applications. Iron chlorosis was corrected by foliar sprays of ferrous sulphate, but not by soil applications. —Central Fla Exp. Stat., Sanford.

1694. WESTGATE, P. J., AND WHITNER, B. F., JR.
Soil management problems in vegetable crop fields.
A.R. Fla agric. Exp. Stats, 1954, pp. 146-7.

Foliar sprays and side-dressings of 12% Fe-EDTA gave good results with crops which included cucurbits, cabbages, beans, peppers, tomatoes, carrots, cauliflowers, eggplants, peas, beets and celery. Germination of pepper seed was better and earlier at low concentrations of fertilizer salts (400 p.p.m.). Growth of pepper, cabbage and tomato seedlings increased with increasing fertilizer salt concentrations, reaching a maximum at 1,500 p.p.m. The rate of cantaloupe growth was increased by planting on the south slope of a ridge row, which reduced damage from sand-laden cold winds.

1695. VON STIEGLITZ, C. R., AND CHIPPENDALE, F.
Nutritional disorders of plants.
[*Publ. out of series*] *Qd Dep. Agric. Stock*, 1955 (?), pp. iv + 36, illus.

This useful publication contains 36 colour photographs portraying mineral element deficiency (or toxicity) symptoms in various agricultural, horticultural and plantation crops. The elements are N, P, K, Ca, B (deficiency and toxicity), Cu, Cn/Zn, Zn (deficiency and toxicity), Mo, Fe, Mn and Cl (toxicity). The horticultural and plantation crops dealt with include certain vegetables, tobacco, citrus, pineapple, rose and eucalyptus. Notes are given in each case on signs, cause and suggested treatment for trial plots.

1696. JACKS, H., AND OTHERS.
Vegetable therapeutant trials in 1953-54.
[*Mim. Publ.*] *D.S.I.R.O., N.Z.*, [undated], pp. 20, bibl. 3.

A summary is given of the results of tests made in 1953–54 on the control of the diseases and pests of tomatoes, french and broad beans, celery, cabbages, peas, carrots, lettuce and spinach, and on the effects of insecticides on the emergence of vegetable seeds.

1697. JACKS, H., AND OTHERS.
Vegetable therapeutant trials in 1954-1955.
[*Mim. Publ.*] *D.S.I.R.O., N.Z.*, [undated], pp. 38.

A summary is given of the results of tests made in 1954–55 on (1) the control of pests and diseases of tomatoes, french and broad beans, cabbages, peas, lettuces, carrots, onions, swedes and celery; (2) the control of the diseases and pests of antirrhinum, chrysanthemum and dianthus; (3) the effects of insecticides on vegetable flavour, seed emergence and viability after storage; and (4) the effect of chloropicrin on the germination of weed seeds.

1698. CANADA, MINISTER OF AGRICULTURE.
Vegetables.
A.R. Canada Minist. Agric. 1954/55, 1955, pp. 30-2.

Cucumber diseases: at Harrow (Ont.), Karathane applied as a smoke was exceptionally effective against

powdery mildew. *Tomato diseases:* late blight was successfully controlled by COCS-55, Manzate and Tricrop. *Root maggots:* in B.C. excellent control of root maggots in swedes was obtained with heptachlor or aldren in pre-sowing applications; in Quebec protection of onions was obtained by dieldrin or DDT. *Vernalization of carrot plants:* the photoperiod received before vernalization was found to affect subsequent flowering, short days resulting in a higher percentage of flowering. Carrots flowered more rapidly when kept in the dark during vernalization.

1699. MENSCHOY, A. B.
Trabalhos entomológicos no Instituto Agronômico do Sul. **(Entomological research at the Agronomic Institute of Rio Grande do Sul.)**
Bol. téc. Inst. agron. Sul, Pelotas **10**, 1954, pp. 68.
The account includes lists of the pests recorded in the State of Rio Grande do Sul on temperate vegetables, capsicum, tobacco, stone and pome fruits, vine, citrus, fig, olive and persimmon.

1700. FREDERICKSEN, C. F., AND LILLY, J. H.
Measuring wireworm reactions to soil insecticides by tagging with radioactive cobalt.
J. econ. Ent., 1955, **48**: 438-42, bibl. 4, illus.
The movements of wireworm larvae to which a radioactive wire had been attached were recorded. Soil treatments with aldrin or lindane reduced wireworm movement to a greater extent than treatment with dieldrin or heptachlor. All 4 materials were quite toxic to wireworms under the conditions of the experiments.—Iowa State Coll., Ames.

1701. WAITES, R. E., AND VAN MIDDELEM, C. H.
Residue studies of toxaphene, parathion and malathion on some Florida vegetables.
J. econ. Ent., 1955, **48**: 590-3, bibl. 5.
On tomatoes, southern peas and okra there was very little difference in amounts of residue using emulsifiable concentrate, wettable powder or dust. Residues of parathion on okra tested 48 hours after application ranged from 0·18 to 0·32 p.p.m. Malathion residues on cabbage had broken down by 40% after 48 hours, and after 7 days of normal weathering about 80% of the residue had disappeared. Residues of parathion on cabbage had broken down by 85% after 3 days and by 97% after 7 days. Parathion residues on turnip greens were reduced by 70–85% after 3 days of weathering, and by 90% after 7 days.—Fla agric. Exp. Stat., Gainesville.

1702. DOESBURG, J. J.
Het vitamine C-gehalte van gesneden groenten. **(The vitamin C content of sliced vegetables.)** [English summary ¾ p.]
Reprinted from *Voeding*, 1955, **16**: 503-18, bibl. 16.
Factors affecting the vitamin C contents of sliced and whole vegetables are discussed.

1703. ISHERWOOD, F. A.
Texture in fruit and vegetables.
Reprinted from *Food Manuf.*, 1955, **30**: 399-402, 420, bibl. 9, illus.
The author discusses the chemical factors underlying texture in relation to the various changes which occur during ripening, cooking, wilting and drying of vegetables. Particular emphasis is laid on the role of lignin, and some observations are made which may lead to a new sensitive method for the determination of lignin in plant tissues. [From author's summary].

Artichokes.

1704. DE LA ROCHA G., G.
El cultivo de la alcachofa, las vainitas y el ajo. **(The cultivation of globe artichokes, beans and garlic.)** [English summary 10 lines.]
Circ. Estac. exp. agríc. La Molina **69**, 1955, pp. 23, illus.
Advice is given on ecology, propagation, cultural practices, varieties, storage and control of pests and diseases.

Asparagus.

(*See also* 1668, 1669.)

1705. SHERMAN, R. W., AND MITCHELL, G. H.
Study points new way in marketing asparagus.
Ohio Farm and Home Res., 1955, **40**: 82-3.
Snapping asparagus requires 50% less field labour than cutting and apparently increases the yield of edible product by 15%, but it poses packing and pricing problems. These are discussed.

1706. GRAHAM, K. M.
Seedling blight, a fusarial disease of asparagus.
Canad. J. Bot., 1955, **33**: 374-400, bibl. 23, illus.
Incidence of seedling blight in Ontario can be correlated with proximity of mature plantations or with the presence of debris from a previous asparagus crop. The pathogen was identified as *Fusarium oxysporum* var. *redolens*. The optimum soil temperature for disease incidence was established at 25°–30° C. Both low and high levels of soil moisture retard emergence and favour pre-emergence blight. Under greenhouse conditions incidence of the disease usually increased more rapidly when leguminous rather than non-leguminous residues were present in the soil. [From author's abstract.]—Bot. and Plant Path. Lab., Ottawa, Ontario.

1707. V.D. VLIET, M.
De voetziekte, *Fusarium oxysporum* (Schl.) Sny et Hansen, e.a. van asperge, *Asparagus officinalis* L. **(Wilt and root rot of asparagus.)** [English summary 8 lines.]
Jaarb. PlZiekt. Dienst, Wageningen, 1954/1955, pp. 209-10, bibl. 4.
The symptoms of attack by *Fusarium* spp. on asparagus are described. Measures preventing an attack include care while lifting and drying the plants, pre-planting applications of TMTD-containing materials, and ploughing the beds as soon as possible after cutting.

1708. MENZIES, J. D.
A Penicillium crown rot of asparagus.
Phytopathology, 1955, **45**: 527-30, bibl. 1, illus.

A previously undescribed crown and root rot of asparagus has caused damage to overwintering asparagus plants in seedling nurseries in the Yakima Valley, Washington. The disease results from infection by *Penicillium martensii* following winter injury. Control recommendations include hilling of plants in the autumn to prevent freezing injury, careful roguing of infected plants during transplanting, and care in handling transplants to prevent unnecessary injury. [From author's summary.]—Irrig. Exp. Stat., Prosser, Wash.

Brassicas.

(*See also* 1287, 1837h, l, n, u, 1838b.)

1709. De Zeeuw, D., and Leopold, A. C.
Altering juvenility with auxin.
Science, 1955, **122**: 925-6, bibl. 8.

In a greenhouse experiment in 1954/55 brussels sprout plants ranging from 5 to 15 weeks old received cold treatment at 5° C. for 9 weeks. In each age-group 0, 50 and 500 p.p.m. NAA in lanolin was applied to the debladed petiole stumps of the 2 youngest mature leaves for a period of 10 days either before, during or after cold treatment. The results were: (1) Controls younger than 11 weeks at the beginning of the cold treatment did not flower without auxin treatment. (2) In plants which were 9 weeks old at the beginning of the cold treatment the application of 50 p.p.m. NAA during cold treatment caused flowering in 60% of the plants, induced flowering at a node below normal, hastened the appearance of flower buds by 3–4 days and increased flower stalk elongation by 16–52%. Application of auxin before or after cold treatment was ineffective in shortening the juvenile phase. It is suggested that the completion of the juvenile phase may be in part the accumulation of a sufficient auxin level at the apical meristem to bring about the condition receptive to cold. [See also *H.A.*, 26: 559.]—Purdue Univ., Lafayette, Ind.

1710. Anstey, T. H.
Inheritance of white petal in green sprouting broccoli.
Canad. J. agric. Sci., 1955, **35**: 573-8, bibl. 9.

White petal, a natural mutation in green sprouting broccoli, is controlled by a single dominant factor and is linked with glossy foliage.—Canada Dep. Agric., Summerland, B.C.

1711. Tsuyama, H., and Sakamoto, M.
Studies on the infection process of soft-rot causing bacteria in Chinese cabbage.
Sci. Reps Res. Insts Tohoku Univ. Ser. D. 1955, **6**: 109-16, bibl. 7.

An account of the progress of the soft rot disease caused by the organism *Erwinia aroideae* in Chinese cabbage. Five definite stages are described.

1712. Gallegly, M. E., and Bishop, C. F.
Pentachloronitrobenzene for control of clubroot of crucifers.
Plant Dis. Reptr, 1955, **39**: 914-17, bibl. 4, illus.

PCNB gave effective control of clubroot of cauliflower and broccoli when mixed with the soil at the rate of 80 lb. of active ingredient per acre before planting or when used in transplant water at 2, 4, or 8 lb. per 100 gal. Plants receiving PCNB developed excellent fibrous root systems with only a few small clubs appearing on their extremities; these plants produced yields normal for the season. At the rate of 2 lb. of PCNB per 100 gal. of transplanting water, clubroot control could be provided for about 15 dollars per acre (12,000 plants) where one-half pint of the fungicidal suspension is used around each plant. [Authors' abstract.]—W. Va agric. Exp. Stat., Morgantown.

1713. Moreton, B. D., and Light, W. I. St. G.
Control of cabbage root fly by root dips.
Plant Path., 1955, **4**: 141-2, bibl. 1.

In 2 experimental plots survival of summer cabbage was significantly greater after dipping the roots in gamma-BHC when transplanting. Some control of the second generation fly was also obtained. In 1954 several root dip materials were tested, and aldrin, dieldrin and gamma-BHC were found to be the most effective, giving a high degree of control of root damage. There was some indication that dipping checked root growth. [For earlier work see *H.A.*, 24: 438.]—N.A.A.S., Wye, Kent.

1714. Harcourt, D. G., and Cass, L. M.
Studies on control of caterpillars on cabbage in the Ottawa Valley, 1953–1954.
Canad. J. agric. Sci., 1955, **35**: 568-72, bibl. 8.

Late cabbages were treated in July and August with foliar applications of insecticidal sprays or dusts to protect the plants against *Pieris rapae*, *Plutella maculipennis* and *Trichoplusia ni*. Twenty per cent. emulsifiable concentrate of endrin at 0·25 lb. of toxicant per acre, 50% wettable DDT powder at 1·0 lb., and 3% DDT dust at 1·0 lb. all gave excellent control. Four per cent. malathion dust at 1·5 lb., and 20% emulsifiable concentrate of dieldrin at 0·25 lb. gave good control. Twenty-five per cent. wettable malathion powder at 1·5 lb., and 20% emulsifiable concentrate of isodrin at 0·25 lb. gave only fair control. There was no indication of a build-up of resistance to DDT by any of the species.—Ent. Lab., Ottawa.

1715. Tanada, Y.
Microbial control of imported cabbageworm.
Hawaii Fm Sci., 1956, **4**(3): 6-7, illus.

A granulosis virus attacks *Pieris rapae* on some Hawaiian islands and sometimes becomes severely epidemic. A spray containing 2 larvae killed by this virus per gal. gave good control of the caterpillars in 6 days. A spray containing 2–4 oz. *Bacillus thuringiensis* spores per 100 gal. also gave good control in a few days. The addition of Triton B-1956 to these sprays at 1 in 800 gave good wetting and was apparently non-toxic to the pathogens.

1716. de Brouwer, W. M. T. J., and van Koot, Y.
Bruinkleuring bij bloemkool na de oogst. **(Brown coloration of cauliflower after harvesting.)** [English summary ¼ p.]
Med. Dir. Tuinb., 1955, **18**: 846-55, illus.

Brown coloration of the curd may occasionally occur on cauliflowers after cutting, generally on one side which may have been unprotected. It was shown that discoloration occurred a few days after the cauliflower had been exposed to sunlight. Exposure to ultra-

violet rays of 2537Å produced a similar discoloration. Cauliflowers which had been protected before harvest were more susceptible to injury by sunlight. A combination of clear sunlight and a strong wind was especially damaging. Tests with several transparent packing materials showed that no discoloration occurred when cellulose-acetate was used, which did not allow the penetration of ultra-violet rays.—Proefstat. Fruit. Groent. Glas, Naaldwijk. [See also *H.A.*, 26: 569.]

1717. Anon.
Cauliflower freight damage waste cut with foil wrap.
Pre-Pack-Age, 1955, **8**(11): 23, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2806.

Cauliflowers were hydrocooled, treated with a decay-inhibiting agent, and wrapped in square sheets of cellophane with aluminium foil laminated by adhesive to 2 opposite edges of the film. The cauliflowers were packed 12 to the crate with corrugated dividers. Damage in transit was diminished by the use of wrappers, and keeping time was increased.

1718. Masters, B. M., Winter, J. C., and Rosanoff, B. P.
Potential savings by shipping cauliflower in double-layer packs.
Market. Res. Rep. U.S. Dep. Agric. agric. Market. Serv. **78**, 1955, pp. 16.

Double-layer packing of closely trimmed heads of cauliflower in the type of crate now used for shipping broccoli may prove more economical than the conventional single-layer pack in the standard pony cauliflower crate.

Celery.

(*See also* 1837d.)

1719. Johnson, K. E. E.
Some chemical aspects of the control of magnesium deficiency in celery grown on the organic soils of Michigan.
Diss. Abstr., 1955, **15**: 1477-8, being *Publ.* 12951 of 96 pp.

Extensive tests in laboratory, field and greenhouse were carried out with 21 celery varieties, including Utah 10B, a variety susceptible to Mg deficiency. Magnesium deficiency was found to occur over a wide range of soil conditions. Control of Mg deficiency in Utah 10B was obtained by broadcast applications of 2–4 tons of magnesium sulphate 1 week after transplanting. Most efficient control of Mg deficiency was obtained by weekly foliar applications of 7 lb. magnesium sulphate in 100–150 gal. water per acre, starting 4 weeks after transplanting. Quality was improved but yields were not increased by Mg treatment; some methods of Mg application reduced yields. Foliar applications of Mg increased the Mg percentage in the plant to a greater extent than did soil applications. Varietal differences in Mg utilization were noted. In mature susceptible plants no Mg-deficiency symptoms developed when the amount of Mg present in the aerial parts was 0·144% or more. Variations in Mg content within varieties were positively correlated with the percentage Mg saturation of the soil exchange complex, and negatively correlated with the Ca : Mg ratio. No consistent effect of Mg application on the uptake of other nutrients was apparent except that, in many cases, it reduced Ca and increased K concentrations in the plant. Analysis of leaves showed that Mg, Mn, P and K contents were higher and Ca, Na and Cu contents were lower in healthy tissues than in chlorotic tissues.

1720. Wilson, J. D.
Maneb gives best control of early blight on celery.
Ohio Farm and Home Res., 1955, **40**: 83-4, 86, illus.

Of the dithiocarbamate fungicides tested against celery early blight (*Cercospora* sp.) maneb gave the best results. Wettable powder applied at 3 lb. per acre every 6 days from shortly after planting to about 10 days before harvest is preferable to the tank-mix formulation. Its use resulted in increases of 76% and 72% in yield and disease control respectively compared with the control.

1721. Jacks, H.
Screening tests with fungicides for control of celery leaf spot (*Septoria apii* Chester).
N.Z. J. Sci. Tech., Sect. A, 1955, **37**: 373-8, bibl. 2.

Of thirty fungicides tested in the glasshouse for control of *Septoria apii*, those based on ferbam, thiram, zineb, maneb, dichlone, captan, nitrobenzene, dinitrophenyl crotonate, chloranil, lime sulphur and diram were the most effective. When treated plants were watered to simulate very heavy rain (1 in. in 6 min.), ferbam, zineb and dichlone formulations were more effective than other compounds in preventing leaf spot infection. [Author's summary].—D.S.I.R., Auckland.

Cucurbits.

(*See also* 1828, 1837m, p, s, t, 1942.)

1722. Anon.
Kaskomkommers. **(Glasshouse cucumbers.)**
Meded. Proefstat. Groent. Fruit. Glas, Naaldwijk, January 1956, p. 1.

At Naaldwijk, in Holland, pruning to one leaf with no tying in increased average yields per plant of cucumbers in comparison with normal pruning.

1723. Seidel, E., Vogel, G., and Trinks, U.
Das Perlongurkenspalier, eine neue technische Einrichtung für die Gurkentreiberei in Gewächshäusern. **(Perlon netting for cucumbers, a new piece of equipment for cucumber growing in glasshouses.)**
Dtsch. Gartenb., 1955, **2**: 305-6, illus.

Perlon netting will last for many years without rusting or rotting. The total annual cost of using such netting is 0·07 DM per sq. m. of glasshouse.

1724. Hayase, H.
Effect of temperature before and after anthesis on pollen viability in cucumber and egg plant. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1955, **24**: 143-8, bibl. 13.

An account is given of pollen viability studies on an agar medium with cucumber, in which the pollen becomes viable before the anthers dehisce, and in eggplant, in which it becomes viable after dehiscence.

In cucumber viability was little changed when the male flowers were stored at 15–30° C. for 21 hours prior to anther dehiscence, but with storage for 39 hours it was prolonged by the lower temperatures and curtailed by the higher, maximum viability being at 20–25° C. In the eggplant anther dehiscence and anthesis were governed by temperature, and dehiscence generally occurred before anthesis. Experiments on storage at 15–30° C. before and after anther dehiscence showed that, in general, higher temperatures curtailed viability and the best temperature for pollen maturation was 20° C.

1725. Hall, B. J., and MacGillivray, J. H.
Mechanized cucumber picking.
Calif. Agric., 1956, **10**(1): 13, illus.

Pickling cucumbers were harvested at a rate of 274 lb. per hour, by using a specially-designed machine. The self-propelled machine has wing platforms on either side, on which the pickers lie so that their hands reach the ground. They pick the cucumbers on to a conveyor belt below the platform which carries the cucumbers to sacks in the central part of the machine. The machine was also used successfully for weeding and thinning cucumbers, and could probably be used for harvesting summer squash and dwarf beans.

1726. de Fina, A. L., and Garbosky, A. J.
Difusión geográfica de cultivos anuales en la provincia de Santiago del Estero. **(Geographical distribution of annual crops in the province of Santiago del Estero.)**
Rev. argent. Agron. B. Aires, 1955, **22**: 137-40.

The crops in question include watermelon which is found all over the province and grows well without irrigation in all areas with a rainfall exceeding 550 mm.

1727. Singh, H. B., and Joshi, B. S.
Do grow these watermelons!
Indian Fmg, 1955, **5**(9): 22-5, illus.

Notes are given on New Hampshire Midget and Asahi Yamato, 2 watermelon varieties selected in trials at the Indian Agricultural Research Institute at New Delhi. Advice is given on culture and on pest and disease control.

1728. Masui, M., Fukushima, Y., and Suzuki, M.
Respiration in melon fruit. [Japanese, with English summary.]
Rep. Fac. Agric. Shizuoka Univ. **4**, 1954, pp. 24-7, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2868.

Determinations of carbon dioxide output per kg. of tissue on normal and 'softening' melons after harvest showed a gradual fall to a minimum respiration in the normal fruit, and an increase to a maximum, with a subsequent fall, in the softening fruit. The softening is apparently a type of over-ripening, correlated with a respiratory climacteric.

1729. Morschel, J. R., and Wallin, D. E.
Incidence of molybdenum deficiency in rockmelons on Murrumbidgee Irrigation Areas.
Agric. Gaz. N.S.W., 1955, **66**: 481, 489.

In the Griffith district unthrifty rockmelon plants affected with chlorosis and marginal burning of leaves recovered following the application of sodium molybdate. Symptoms were observed in plants growing on neutral and acid soils, and it is thought that the total molybdenum content of some soils in the area is insufficient to supply the needs of this crop. [From authors' summary.]

1730. Adsuar, J.
Susceptibility of some varieties of melons to the cucurbit viruses present in Puerto Rico.
J. Agric. Univ. Puerto Rico, 1955, **39**: 111.

In the course of investigations on the possibility of commercial melon growing in Puerto Rico 4 varieties which have been successfully grown experimentally were all found to be susceptible to the 2 viruses which attack cucurbits on the island.

1731. Boelema, B. H.
Anthracnose in watermelons.
Fmg S. Afr., 1955, **30**: 444, 452, bibl. 3, illus.

Notes are given on the symptoms of and injuries resulting from anthracnose (*Colletotrichum lagenarium*) in watermelons and on conditions favourable to infection and development of the disease. No commercial varieties are immune. Cape Mountain Sweet and Tom Watson are very susceptible. Congo, Sugarstick and Hawkesbury show some resistance. Control is by spraying or dusting with zineb or by spraying with captan or TMTD at the recommended commercial rates.—Hort. Res. Stat., Pretoria.

1732. Revilla Morante, V. A.
Control del oidium del melon, zapallo y pepino. **(Control of powdery mildew on melon, pumpkin and cucumber.)** [English summary ⅔ p.]
Bol. Estac. exp. agric. La Molina **60**, 1955, pp. 15, bibl. 4, illus.

In recent experiments karathane applied thrice at intervals of 10 days, either as a 1% dust at 28 kg. per ha. or as a 0·12% spray plus adhesive at 1,000 l. per ha., gave very good preventive and curative control of *Erysiphe cichoracearum* on melon, pumpkin and cucumber, and did not cause leaf burn. Dusting is considered the more practicable treatment with plants of vigorous growth and does not cause the mechanical injury to the growing tips that is sometimes associated with spraying.

1733. (Conroy, R. J.)
Disease threatens rockmelons.
Agric. Gaz. N.S.W., 1955, **66**: 459.

An outbreak of what appears to be a specialized rockmelon strain of fusarium wilt, not previously recorded in New South Wales, has destroyed a rockmelon crop at Brookvale. A subsequent glasshouse test of 18 varieties proved them all to be very susceptible to the disease.

1734. Marlatt, R. B.
Acti-dione sprays on cantaloup.
Plant Dis. Reptr, 1955, **39**: 824.

Acti-dione had no apparent phytotoxic effect on young cantaloupe plants even when applied 5 times in a 30-day period at 4 p.p.m.—Univ. Ariz. agric. Exp. Stat., Mesa.

1735. Michelbacher, A. E., and others.
Controlling melon insects and spider mites.
Bull. Calif. agric. Exp. Stat. **749**, 1955, pp. 46, bibl. 35, illus.
Parathion is recommended for the control of all the major melon pests of California, namely, cucumber beetles (*Diabrotica* spp. and *Acalymma trivittata*), melon leaf hopper (*Empoasca abrupta*), melon aphid (*Aphis gossypii*), an agromyzid leaf miner (*Liriomyza subpusilla*) and spider mites (*Tetranychus* spp.). Notes are also given on the control of minor pests including nematodes.

1736. Harries, F. H., and Valcarce, A. C.
Laboratory tests of the effect of insecticides on some beneficial insects.
J. econ. Ent., 1955, **48**: 614, bibl. 1.
The striped collops (*Collops vittatus*) is found as a predator of spider mites on cantaloupes. In tests with several insecticides it was found to be relatively resistant to their effects.—Ent. Res. Branch, Agric. Res. Serv., U.S.D.A.

1737. Popovich, M., Devcic, J., and Castronovo, A.
Efectos de la competencia en los ensayos comparativos con zapallitos de tronco. **(Effects of competition in trials on unsupported pumpkins.)**
Rev. Invest. agríc. B. Aires, 1955, **9**: 373-8, bibl. 2.
With *Cucurbita pepo* sown at spacings of 0·8, 1·2 and 1·6 m. apart in rows 1·2 m. apart the yields were 28·0, 14·56 and 10·37 kg. per plot respectively, the first being significantly greater than the last. With *Cucurbita maxima* at the same spacings the plot yields were 27·46, 23·67 and 26·25 kg. respectively.

1738. Harries, F. H., and Matsumori, H.
Insecticide tests on the squash bug.
J. econ. Ent., 1955, **48**: 613-14, bibl. 10.
In laboratory tests parathion, malathion, EPN and dieldrin were the most effective materials for control of squash bug (*Anasa tristis*). In a field experiment with gourds, bug populations were considerably reduced by malathion and parathion dusts, and by aldrin and dieldrin sprays. A spray of arsenomethane As-As disulphide (A-42) had a repellent effect.—Ent. Res. Branch, Agric. Res. Serv., U.S.D.A.

Legumes.

(*See also* 1305, 1311, 1312, 1315-1318, 1325, 1328, 1334, 1336, 1349, 1671, 1704, 1828, 1837c, f, g, x, 1838d, 1943.)

1739. Natti, J. J., and Schroeder, W. T.
Silicones as lubricants for pea seed protectants.
Plant Dis. Reptr, 1955, **39**: 909-13.
A fungicidal and 2 insecticidal seed protectants retarded the passage of pea seeds through a drill by 13–15%. Each of 3 silicone emulsions tested eliminated most of this retarding effect either when superimposed on the fungicidal dust treatment or when used as slurry media with the 2 insecticidal dressings.—N.Y. St. agric. Exp. Stat., Geneva.

1740. Highkin, H. R.
Flower-promoting activity of pea seed diffusates.
Plant Physiol., 1955, **30**: 390, bibl. 3.
An extract from pea seeds was capable of replacing cold treatment for a pea variety susceptible to vernalization, by reducing the number of nodes to the first flower.—Calif. Inst. Technol., Pasadena. [A fuller account of work noted *H.A.*, 26: 608.]

1741. White, D. J. B.
The development of the runner bean leaf with special reference to the relation between the sizes of the lamina and of the petiolar xylem. III. The development of the leaf under various conditions.
Ann. Bot. Lond., 1956, **20**: 167-77, bibl. 4.
The development of the first pair of leaves of the runner bean (*Phaseolus multiflorus* Willd.) under various conditions is described. Under damp conditions and also when one leaf of a pair was covered with a black paper envelope, the rate of development was altered, but no significant changes in the relative development of the parts of the leaf occurred. Removal of a portion of the lamina at an early stage of development resulted, at maturity, in a leaf having relatively less petiolar xylem, although the ratio xylem area/lamina area was slightly higher. This treatment also delayed a "sudden" increase in area of the vessels which was seen in normal plants. An attempt was made to estimate the transporting power of the petiolar xylem and to compare it with the lamina area. The data suggest that the maximum possible area of the lamina at any stage in development may be determined by the transporting power of the xylem, but that the attainment of this maximum possible area may be prevented by external factors as is seen in some of the experimental results presented. [Author's summary.]—Dep. Bot., Univ. Coll., London.

1742. Williams, W. T., Preston, R. D., and Ripley, G. W.
A biophysical study of etiolated broad bean internodes.
J. exp. Bot., 1955, **6**: 451-7, bibl. 14, illus.
The internodal cortical parenchyma of etiolated and normal broad bean seedlings has been examined by techniques appropriate to normal and polarized light, X-ray and electron diffraction, and the electron microscope. No fundamental differences in fine-structure were observed, the cellulose being in both cases organized into well-marked but only feebly crystalline microfibrils weakly orientated in a transverse direction. The cells produced in darkness, though larger and showing a reduced tendency to differentiate into collenchyma, are fundamentally normal in type; and the gross morphological differences must primarily be sought in a changed disposition of the products of cell-division at the apex. [Authors' summary.]—Univ. Southampton, and Univ. Leeds.

1743. McKee, H. S., Nestel, L., and Robertson, R. N.
Physiology of pea fruits. II. Soluble nitrogenous constituents in the developing fruit.
Aust. J. biol. Sci., 1955, **8**: 467-75, bibl. 22.

Soluble nitrogenous compounds in the seeds and pods of developing fruits of *Pisum sativum* var. Canner's Perfection were studied at successive stages of growth during 2 seasons.—Plant Physiol. Univ. C.S.I.R.O., Univ. Sydney. [For part I see *H.A.*, 26: 605.]

1744. Bean, R. C., and Hassid, W. Z.
Synthesis of disaccharides with pea preparations.
J. Amer. chem. Soc., 1955, **77**: 5737-8, bibl. 6.

Experiments showed that peas contain an enzyme (probably the same as the one responsible for the reaction of uridine diphosphate glucose with D-fructose to form sucrose) which is capable of producing D-glucosyl-D-xyluloside from uridine diphosphate glucose and xylulose; and D-glucosyl-D-rhamnuloside and D-glucosyl-L-sorboside from the same nucleotide and D-rhamnulose.—Dep. Plant Biochem., Coll. Agric., Univ. Calif., Berkeley.

1745. Medina, A., and Sols, A.
A specific fructokinase in peas.
Biochem. biophys. Acta, 1956, **19**: 378-9, bibl. 13.

A new type of fructokinase has been identified in green pea seeds. Its existence may help to explain the mechanism of the apparent accumulation of glucose as the sucrose content diminishes at certain stages of germination.—Inst. Fis., Fac. Med., Madrid.

1746. Lilly, L. J., and Thoday, J. M.
Effects of cyanide on the roots of *Vicia faba*.
Nature, 1956, **177**: 338-9, bibl. 7.

Cyanide was found to have significant effects on elongation of *Vicia faba* roots, primarily in the presence of oxygen. There is a similar effect on the progress of mitosis. Mitotic index (proportion of cells in metaphase, anaphase or telophase) is temporarily reduced after the period in nitrogen, and the reduction may be increased very slightly by cyanide. Oxygen alone produces little effect. Cyanide and oxygen together, however, produce a greater and more prolonged inhibition of mitosis.—Dep. Bot., Univ. Liverpool.

1747. Unger, K., and Schneider, A.
Über Zusammenhänge zwischen der Reifeentwicklung von Gemüseerbsen und bestimmten mikrometeorologischen Faktoren. **(The relations between maturation of garden peas and certain micrometeorological factors.)**
Züchter, 1956, **26**: 12-22, bibl. 13.

In 1954, on the ripening of 36 pea varieties, records were made of changes in dry weight and firmness of the seeds. Microclimatic factors were also noted. Temperature was the most important factor affecting maturity. When the temperature was below 15° C. maturity was delayed. Vegetative development was also dependent on microclimatic conditions, but was chiefly related to evapotranspiration. Temperature sums provided a measure of varietal differences in ripening speed.—Inst. PflZucht. Quedlinburg, Berlin.

1748. Rehm, S.
Control of seed-coat splitting in beans.
Fmg S. Afr., 1955, **30**: 507-10, 523-4, bibl. 3, illus.

Seed-coat splitting is a serious problem for the producer of bush bean (*Phaseolus vulgaris*) seed in South Africa. Experiments show that excessive nitrogen supply increases, and a certain degree of phosphate deficiency may reduce, the percentage of split seed. High temperature during the period of pod elongation favours splitting, which can be avoided by choosing the sowing time so that elongation will occur in a period of moderate temperature. The best sowing times for four stations are given. By growing plants under conditions most favourable for splitting, it has been possible to select constantly low-splitting lines from two normally high-splitting varieties.—Pretoria hort. Res. Stat.

1749. Zopf, P. E., Jr.
Shallow cultivation found best for beans.
Market Grs' J., 1955, **84**(11): 16, illus.

A series of tests with snap beans was carried out on sandy soil in Florida. It was shown that cultivating to a depth of 3 inches every 5 days reduced yields to less than half those obtained with hand-weeding. The best yields were obtained from cultivations to a depth of 1 inch, when little root damage was done.

1750. Pastac, I. A.
Alimentation foliaire des plantes. **(Foliar nutrition of plants.)**
Reprinted from *C.R. XXVII^e Congr. int. Chim. industr.*, 1954, Brussels, pp. 3, bibl. 3.

Potassium nitrate and monopotassic phosphate were used in experiments on the foliar nutrition of vegetables, with urea added when it was desired to supply an excess of N. Of 5 NPK formulas used the best was 8–1–9. The best concentration was 1 : 10,000. Peas and beans responded well to N. NPK gave better results than NK or PK.—Labs. G. Truffaut, Versailles.

1751. Schmidt, G.
Über die Einwirkung von Umweltbedingungen, insbesondere von der Stickstoffernährung, auf die Knöllchenbildung und N-Bindung von *Vicia faba* L. **(On the influence of environment, in particular nitrogen nutrition, on nodule formation and N-fixation of *Vicia faba* L.)** [Russian, English and French summaries.]
Kühn-Arch., 1955, **69**: 166-222, bibl. 40.

The effect of environmental conditions on nodulation and N-fixation in *Vicia faba* was studied in water cultures. Of the several N compounds tested calcium nitrate had the most favourable effect. The different effects obtained with the several compounds are chiefly due to the reaction of the nutrient solutions. In general nodulation and N-fixation was increased by applications of calcium nitrate in the early stages of growth. Inoculations given at a late stage of plant development caused nodule formation only on roots of plants simultaneously receiving N. Inoculated plants with vigorous nodules, or their excised roots, absorbed less nitrate from the medium and contained more nitrate in dry matter, than non-inoculated plants or roots of the same age without nodules. There was a definite seasonal effect on results. When the experiments were started in late spring less nodulation and N-fixation was obtained than when they were started in

early spring or autumn. Plants grown in long and short day in summer did not show much variation in nodulation and N-fixation. In winter only small amounts of N were fixed. Shading of plants receiving N caused reduced nodulation and N-fixation, but this did not occur in shaded plants without N.

1752. WARINGTON, K.
The influence of high concentrations of ammonium and sodium molybdates on flax, soybean and peas grown in nutrient solutions containing deficient or excess iron.
Ann. appl. Biol., 1955, **43**: 709-19, bibl. 14, illus.

Temporary darkening of the green colour of the shoots was produced by 40 p.p.m. Mo in iron-deficient pea plants but was soon followed by more severe chlorosis. Symptoms of molybdenum toxicity always developed when 40 p.p.m. Mo were given, whether or not the intensity of chlorosis was reduced. With an increase in iron supply, a reduction in molybdenum toxicity symptoms was confirmed. High iron reduced the molybdenum content (p.p.m./d.m.) of both shoot and root. High molybdenum usually reduced the iron content of the shoot, but markedly increased it in the root. Molybdenum-induced chlorosis could thus be partly attributed to inhibition in iron translocation, but the beneficial effect of high molybdenum or high iron on colour was not obviously correlated with the analytical data. [From author's summary.]—Rothamsted exp. Stat.

1753. LÖHNIS, M. P.
Influence of magnesium on the uptake of manganese.
Rep. and Commun. 8th int. bot. Congr., Paris, 1954, pp. 83-5, bibl. 3.

As previously described [see *H.A.*, 21: 3207 and 22: 1506] *Phaseolus* beans grown in unlimed, highly acid soil at Wageningen were affected by Mn toxicity. Magnesium sulphate top dressings reduced Mn uptake and greatly improved development compared with that of untreated plants. Although *Vicia sativa* is very susceptible to Mn injury, Mg treatment had no effect on its Mn content or Mn toxicity symptoms.

1754. REYNOLDS, J. D.
Marsh spot of peas: a review of present knowledge.
J. Sci. Food Agric., 1955, **6**: 725-34, bibl. 52, illus.

A review of a disorder due to deficiency or unavailability of manganese. The effect on the seed may be prevented by spraying a solution of a manganese salt on the crop at flowering time, but several applications at intervals during growth are probably necessary to ensure a healthy crop. Other advantages of the use of manganese are also mentioned and reference is made to the effect of Marsh Spot on consumer quality. [From author's summary.]—Res. Stat., Yaxley, Peterborough.

1755. VAN DER WANT, J. P. H.
Onderzoekingen over virusziekten van de boon (*Phaseolus vulgaris* L.). (**Studies on bean viruses.**) [English summary 10 pp.]
Meded. Inst. PlZiekt. Onderz. Wageningen **85**, 1954, pp. 84, bibl. 68, illus.

The symptoms caused by 3 viruses in French beans are described. *Myzus persicae* was a more effective vector of *Phaseolus virus* than *Aphis fabae*.

1756. QUANTZ, L.
Eine für Deutschland neue Viruskrankheit der Gartenbohne durch ein Tabaknekrose-Virus. (**A virus disease of beans new to Germany, caused by a tobacco necrosis virus.**)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1956, **8**: 7-8, bibl. 6, illus.

Symptoms of bean stipple-streak have been found on French beans in Germany. Some control may be obtained by delaying the succession of beans on the same soil. Well-drained and airy conditions with good spacing and weed control help to reduce the likelihood of infection. Some varieties are more susceptible to attack than others.—Biol. Bundesanst., Braunschweig.

1757. WADE, G. C.
***Aphanomyces* root rot of peas—the effect of a potassium fertilizer on the severity of the disease in a potassium deficient soil.**
J. Aust. Inst. agric. Sci., 1955, **21**: 260-3, bibl. 7.

Analyses of pea plants affected with *Aphanomyces* root rot showed that they had a lower K content than healthy plants. In a greenhouse experiment the application of potassium chloride at the rate of 4 cwt. per acre reduced the severity of *Aphanomyces* root rot. In canisters subjected to saturation for 1 week potassium chloride reduced the number of plants killed, and in canisters held at normal moisture content throughout it reduced the number of plants which became infected. Potassium chloride resulted in an improvement in growth in both soil saturated for 1 week and soil held at normal moisture content. [Author's summary.]—Tasmanian Dept. Agric., Hobart.

1758. REVILLA M., V., VARGAS S., R., AND SÁNCHEZ A., J. L.
Control de la chupadera del frijol. (**Control of damping-off in beans.**)
Inf. mens. Estac. exp. agric. La Molina, Lima, 1955, **29**(335): 7-11.

In 3 years' experiments on seed dressing for the control of damping-off due to *Corticium solani* in beans Arasan S.F. at 6 g. per kg. seed gave the best results followed by Arasan at 1 g.

1759. TISDALE, W. B., MOORE, W. D., AND SWANK, G., JR.
Damping-off and root rots of vegetable crops.
A.R. Fla agric. Exp. Stats, 1954, pp. 118-19.

Chopped lupin plants and fungus cultures were added to pots of sand at varying intervals before planting beans. Disease incidence was most severe when planting took place 7 or 14 days after the addition of organic matter and fungus. In field tests *Rhizoctonia* infection was significantly worse on plots bedded and planted on the same day than on plots planted 5 or more days after bedding. In pot tests 12 types of dried organic matter significantly reduced *Rhizoctonia* infection, while green material tended to increase infection for a short period. Seed and soil treatment with pentachlornitrobenzene or pentachloroanisole at the time of planting significantly reduced *Rhizoctonia*

infection of snap beans planted in sandy, muck and marl soils.

1760. Domsch, K. H.
Zur Wirkung von Beizmitteln gegen Bodenpilze. I. (The effect of seed disinfectants on soil fungi. I.)
Phytopath. Z., 1956, **25**: 311-22, bibl. 14.
A series of experiments was carried out to investigate the disinfection of pea seed with a mercuric fungicide against soil fungi, especially *Rhizoctonia solani*. Soil moisture and temperature variations appeared to have little effect on the action of the fungicide. There was some indication of increased susceptibility of soil fungi to fungicides at extreme levels of pH. The efficiencies of other organic fungicides were compared under controlled conditions. A simple method of estimating absorption of Hg-containing substances by soil is described.—Lab. gärtn. Pflanzenb., Kiel-Kitzeberg.

1761. Oteifa, B. A.
Nitrogen source of the host nutrition in relation to infection by a root-knot nematode, *Meloidogyne incognita*.
Plant Dis. Reptr, 1955, **39**: 902-3, bibl. 1.
In an investigation on lima beans, *Phaseolus lunatus*, it was found that the injury caused by *Meloidogyne incognita* and the number of females and egg masses produced on infected roots were less with ammonia than with nitrate N.—Fac. Agric., Cairo Univ., Giza, Egypt.

1762. Gellatley, J. G.
Control of black bean aphids.
Agric. Gaz. N.S.W., 1955, **66**: 494-5, bibl. 2, illus.
Spraying over the tops of young bean plants with 0·13% schradan gave complete protection against black bean aphid (*Aphis craccivora*) infestation for 3–4 weeks. Systox top sprays at 0·25 and 0·55% gave good results, but there were indications of breakdown of the systemic effect 3 weeks after spraying. Parathion at 0·075% gave some indication of systemic activity, but the exact duration of this could not be measured. Schradan and systox cannot be recommended for use on beans until more is known of the toxicity hazard to the consumer.

1763. Franssen, C. J. H.
Bestrijding van de erwtenbladrandkever met parathion. **(Control of pea and bean weevils with parathion.)** [English summary 4 lines.]
Meded. Inst. PlZiekt. Onderz. Wageningen **90**, reprinted from *LandbVoorl.*, 1955, **12**: 191-6, illus.
Control of thrips (*Thrips angusticeps*) and weevils (*Sitona lineatus*) on young peas was obtained by parathion sprays at the rate of 400 g. active ingredient per acre. Wettable powders should be used to prevent leaf damage.

1764. Parkin, E. A., and Bills, G. T.
Insecticidal dusts for the protection of stored peas and beans against bruchid infestation.
Bull. ent. Res., 1955, **46**: 625-41, bibl. 26.
Laboratory tests showed that protection of peas and beans from *Acanthoscelides obtectus* and *Callosobruchus chinensis* infestation can be achieved by thoroughly mixing into 200 lb. of the commodity 6–8 oz. of one of the following dusts: colloidal silica, colloidal aluminium pentasilicate, finely ground diatomite, 0·05% γ BHC (as lindane) on diatomite or kaolin, 0·5% technical DDT on diatomite or kaolin. Where lindane or DDT are used in the dosages given, it is unlikely that the commodity will be tainted or rendered toxic to man or animals, even if no cleaning is undertaken.—D.S.I.R., Pest Infest. Lab., Slough.

1765. Smith, F. L.
The effects of dates of harvest operations on yield and quality of Pink beans.
Hilgardia, 1955, **24**: 37-52, bibl. 1, illus.
Cutting 1 week before Pink beans reached maturity greatly reduced browning, but also reduced yield and bean size. The percentage of brown beans increased rapidly with exposure, either standing in the field or in the windrow. The percentage of browning in Sutter Pink was lower than in other varieties tested. [From author's summary.]—Exp. Stat., Davis, Calif.

Mushrooms.

1766. Barrett, T.
The commercial cultivation of mushrooms.
[*Publ.*] *J. E. R. Simons Ltd.*, Harlow, 1955, pp. 32, illus.
The subjects covered are buildings, composting, filling the beds, peak-heating, spawning, casing, cultural treatment, pest control and marketing. There is an appendix on the tray system.

1767. Reeve, E., and Robbins, W. A.
Mushroom strain evaluation studies.
Bull. Mushroom Grs' Ass., 1956, No. 73, pp. 10-13, bibl. 3.
Of the commercial mushroom strains tested the best yields and growth behaviour were obtained from the white strains. White strains from two sources consistently out-yielded a white strain from a third source. All white strains were considerably smaller than the brown strains tested and produced fewer diseased mushrooms. Premature dying was a particularly serious attribute of the brown mushroom strains tested. [From authors' summary.]—Campbell Soup Co., West Chicago.

1768. Lambert, E. B., and Ayers, T. T.
Magnesium in mushroom casing soil.
Plant Dis. Reptr, 1955, **39**: 837-8, bibl. 4.
Experiments confirmed that mushroom growers need not be concerned about the proportion of magnesium carbonate in limestone used for neutralizing casing soil that has been derived from the top 6 inches of a well developed profile.—Hort. Crops Res. Branch, agric. Res. Serv., U.S. Dep. Agric.

1769. Gandy, D. G.
Some disorders of cultivated mushrooms.
Plant Path., 1955, **4**: 118-19, bibl. 2, illus.
Under-development of gills and veils was the most common abnormality observed on 4 farms. The symptoms did not correspond to those of "La France" disease. There was some indication in laboratory experiments that the disease was contagious.—Glassh. Crops Res. Inst., Littlehampton, Sussex.

1770. Ayers, T. T., and Lambert, E. B.
Controlling mushroom diseases with chlorinated water.
Plant Dis. Reptr, 1955, **39**: 829-36, bibl. 10, illus.

Experiments have shown that bacterial blotch, soft rot of pinheads, Verticillium spot and Mycogone diseases of mushrooms may be controlled by chlorinating the water used for wetting the beds. The recommended strength is 50 to 200 p.p.m. of available chlorine. The first application should be delayed until the mushrooms begin to appear on the beds. When this procedure is followed, several diseases are materially reduced with no detrimental effect on the yield or quality of the mushrooms and no health hazard to consumers or men working in the mushroom houses. [Authors' summary.]—Hort. Crops Res. Branch, agric. Res. Serv., U.S. Dep. Agric.

Onions and related crops.

(*See also* 1344, 1672, 1704, 1837e, q, w.)

1771. Singh, H. B., and Bhagchandani, P. M.
Onions that yield well and store well.
Indian Fmg, 1955, **5**(8): 24-6, illus.

Notes are given on the culture and storage of the American variety Early Grano and the local variety Pusa Red, which have recently been selected at the Indian Agricultural Research Institute and are doing well under Delhi conditions.

1772. Meloche, H. P., Jr., and Fabian, F. W.
The pectolytic activity of extracts of different types of onions.
Food Res., 1955, **20**: 1-8, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2890.

Experiments demonstrated a direct relationship between resistance to mould infection and pectin esterase activity and indicated that the pectin esterase activity of onions may be a good index of their keeping quality.

1773. Chaugule, B. A., Khot, B. D., and Kanekal, G. S.
Maleic hydrazide—a promising plant growth inhibitor in crop production.
Poona agric. Coll. Mag., 1955, **46**: 21-6, bibl. 11.

The results of experiments with 40% MH at the Agricultural College farms, Dharwar and Poona, were: (1) Spraying onions 2½ months after transplanting controlled bolting better than spraying 3½ months after transplanting, but caused appreciable rotting, while spraying at the later date improved storage quality. (2) Spraying *bidi* tobacco with a 4% solution gave satisfactory sucker control without affecting the yield adversely and increased the yield in some cases. (3) Spraying *Cynodon dactylon* with 3–4% solution suppressed growth for 2 months.

1774. Ninomiya, K.
Effects of maleic hydrazide spraying on vegetable crops. I. Effects of concentration and time of spraying on onions for storage.
[Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1955, **24**: 131-42, bibl. 17, illus.

The best inhibition of sprouting in storage was obtained with either the sodium salt at 0·4% or the diethanolamine salt at 0·1% applied at 70–90 l. per ha. 1–3 weeks before harvesting.

1775. Sparrow, A. H.
The atomic age for vegetables.
Amer. Veg. Gr, 1955, 3(8): 11, 18, illus.

An irradiation dosage of 4,000 r has given very good control of sprouting in sweet Spanish onions. The types of irradiation used have been X-rays, gamma rays and fast electron beams.

1776. Hardenburg, R. E.
Ventilation of produce.
Mod. Packag., 1955, **28**(7): 140-4, 199-200, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2804.

Packaging tests were carried out to investigate the ventilation of film bags for onions and the type and number of perforations required to maintain quality during marketing. Onions could be kept in good condition in kraft bags with Lumarith windows throughout the marketing period (7 to 14 days at 75° F. (24° C.)), but the loss in weight was slightly greater than it was in perforated film bags. When adequately perforated, polyethylene and Pliofilm bags were also satisfactory; for a 3-lb. bag, the best results were obtained with at least 16, and preferably 32, holes ¼ in. in diameter. Losses in weight and losses due to deterioration, rooting and sprouting were greater in onions which had been held in cold storage for several months before packaging than in freshly harvested onions. The need for ventilation was greater with the stored onions than with the freshly harvested onions, owing to the need to prevent rooting.

1777. Lange, W. H., Jr.
***Aceria tulipae* (K.) damaging garlic in California.**
J. econ. Ent., 1955, **48**: 612-13, bibl. 4, illus.

The foliage of garlic bulbs attacked by *Aceria tulipae* showed virus-like symptoms of damage. Bulb fumigation with 2·5 lb. of methyl bromide per 1,000 cu. ft., with a 2-hour exposure at 80° F., gave a complete kill of the mites without damaging the bulbs. A combination of fumigation and dusting with sulphur to prevent reinfestation may prove practical.—Univ. Calif., Davis.

Rhubarb.

1778. McCoward, D. J.
Marketing forced rhubarb.
Agriculture, Lond., 1956, **62**: 543-6.

A survey of the methods of marketing forced rhubarb grown in Cheshire and the West Riding of Yorkshire was made last year. Greater uniformity would be in the growers' interests.

Root crops.

(*See also* 1326, 1331, 1670, 1799, 1838a.)

1779. Dale, J. E., and Sutcliffe, J. F.
Inhibition of salt absorption in red beet root tissue.
Nature, 1956, **177**: 192-3, bibl. 3.

In investigations on the uptake of K ions by disks of

red beet root tissue it was found that in the presence of extract of this tissue K uptake (from various salts) was reduced and O_2 absorption was considerably stimulated, dilution of the extract reducing its effects. The significance of this is discussed and it is concluded that (1) the apparent inhibitory effect of tissue extracts of red beet is mainly attributable to association of a proportion of the cations present with organic anions, which are absorbed more slowly than chloride and cause a retardation in the rate of uptake of cations, and (2) the inhibition is without significance either in relation to the life-cycle of the beet plant, or to the development of an absorptive capacity in tissue disks. —Dep. Bot., King's Coll., London. [See also *H.A.*, 22: 3862.]

1780. Bregoff, H. M., and Delwiche, C. C.
The formation of choline and betaine in leaf disks of *Beta vulgaris*.
J. biol. Chem., 1955, **217**: 819-28, bibl. 26, diagram.

When leaves of *Beta vulgaris* were infiltrated with solutions of acetate-2-C^{14}, glycine-2-C^{14}, formate or bicarbonate, appreciable activity was found in choline and betaine arising from α-labeled glycine or from formate. Bicarbonate was incorporated to a lesser extent, and the α-carbon of acetate, although assimilated, was not incorporated into choline or betaine. The specific activity of choline isolated, depending upon the experiment, was 10 to 30 times that of the betaine when formate or glycine-2-C^{14} was infiltrated. Partial degradation of choline and betaine indicated that, when labeled formate was infiltrated, virtually all of the label appeared in the methyl carbon of the quaternary nitrogen compounds whereas, when glycine-2-C^{14} was infiltrated, both the *N*-methyl and the 2-carbon residues received the label. [Authors' summary.]—Univ. Calif., Berkeley.

1781. de Capite, L.
Azione degli zuccheri e delle basse temperature nella formazione degli antociani in radici di *Daucus carota* L. coltivate *in vitro*.
(Action of sugars and low temperature in the formation of anthocyanin in the root of *Daucus carota* cultured *in vitro*.)
Ric. sci., 1955, Vol. **7**, from abstr. in *Riv. Ortoflorofruttic. ital.*, 1955, **39**: 584.

Anthocyanin is manufactured under aerobic conditions in the presence of sugars and at low temperatures.

1782. Goodman, O.
Further investigation of some of the factors affecting quality and yield in carrot crops.
J. Dep. Agric. Dublin, 1953-54, **50**: 104-28, bibl. 14, illus.

Experiments were carried out on manuring, variety, spacing, times of sowing and times of lifting maincrop carrots; most of the experiments were on a fine sandy loam deficient in nitrogen, phosphate and potash. Only a moderate amount of N was found necessary to give maximum yields, and excess N tended to increase root splitting. An adequate phosphate status was necessary for maximum yield. Potash manuring had little effect on yield. Wide spacing of plants depressed yield and increased percentages of split and coarse roots. Increased yields with higher proportions of split roots were obtained by early sowing, and by leaving the roots a relatively long time in the ground. Root splitting tended to increase with yield, and was more prevalent in stump-rooted varieties. The root tension causing root tissue to split was increased by dry conditions.—Johnstown Castle agric. Coll. [For an earlier report see *H.A.*, 24: 3890.]

1783. Thompson, B. D.
Black-spotting of radishes after harvesting.
A.R. Fla agric. Exp. Stats, 1954, p. 112, illus.

Small, irregular, sunken, greyish-brown to black spots may appear on radishes a few days after harvesting. Tests were made with pre-cooling, storage temperatures, chlorine solution dips and packaging immediately after harvesting radishes. At the storage temperatures used precooling retarded the development of the spots, and the effect was highly significant in storage at 70° F. Storage at 40° and 50° F. prevented the occurrence of spotting. Spot development was not inhibited by dipping radishes for 30 minutes in hypochlorite solutions of up to 2,500 p.p.m. Cl_2. Radishes were severely injured by 500 p.p.m. chlorine. No spotting or discoloration occurred in sealed bags.

1784. Lutz, J. M., Kaufman, J., and Hruschka, H. W.
Shelf-life of pre-packaged radishes in relation to type of film, temperature, and amount of trimming.
Pre-Pack-Age, 1954, **8**(4): 13-16, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2802.

Pre-packaging increased shelf-life and decreased loss of weight. Polyethylene film gave the best results; Pliofilm and semi-moistureproof cellophane were also satisfactory. Perforation of each package with 4 holes ($\frac{3}{16}$ in.) is recommended. Storage life was extended by complete removal of tops; removal of root tips was also of advantage. Pre-packaged radishes kept in good condition for as long as 3 days at 70° F. (21° C.) and 7 days at 45° F. (7° C.), but prompt and adequate refrigeration is recommended.

1785. Matthews, R. E. F.
Infectivity of turnip yellow mosaic virus containing 8-azaguanine.
Virology, 1955, **1**: 165-75, bibl. 9.

Treatment with 8-azaguanine delays the development of turnip yellow mosaic virus when small Chinese cabbage plants are used. Small amounts of 8-azaguanylic acid were found in the nucleic acid of virus from treated plants. The infectivity of virus preparations containing 8-azaguanine was less than that of normal preparations containing the same amount of virus nucleic acid. No difference in the proportion of protein and nucleoprotein particles was detected in virus preparations from control and from treated plants. A method is described for estimating virus protein in clarified plant sap. [From author's summary.] —A.R.C. Plant Virus Res. Unit, Cambridge.

1786. King, K. M., and others.
Co-ordinated experiments on chemical control of root maggots in rutabagas in British Columbia and Washington, 1953.
J. econ. Ent., 1955, **48**: 470-3, bibl. 2.

In trials at five localities, highly effective control of *Hylemyia brassicae* was obtained under varying climatic and local conditions with heptachlor and aldrin. The methods of application used are described, namely band, spray and furrow applications. Seed treatments did not show promise in control.—Dept. Agric., Ottawa, and W. Wash. Exp. Stat.

Salad crops.

(*See also* 1330, 1799, 1808, 1837d.)

1787. Ministry of Agriculture, London.
Salad and other food crops in glasshouses.
Bull. Minist. Agric. Lond. **143**, second edition, 1955, pp. 51, illus., 2s. 6d.

This bulletin covers a much wider field than the first edition [see *H.A.*, 20: 1597] which dealt only with lettuce, mustard and cress, radish, mint and cucumber. The scope has been broadened to include the commercial production of most other vegetable crops normally grown in glasshouses, with the important exception of tomatoes which are fully treated in Bull. 77. There are chapters on french beans, cucumber, lettuce (heated and cold houses and marketing), melon, mint, mustard and cress, vegetable plants for sale, miscellaneous crops (including egg plant, capsicums, mushrooms, radish, rhubarb, strawberries and marrow), and on the pests and diseases of beans, cucurbits, lettuce, mint, mustard and cress. There is an appendix on the preparation of John Innes seed and potting composts.

1788. Ministry of Agriculture, London.
Outdoor salad crops.
Bull. Minist. Agric. Lond. **55**, revised 1956, pp. 48, illus., 2s. 6d.

The bulletin covers the commercial production of the commoner salad vegetables, as well as that of chicory, endive, corn salad and celeriac. There is a section on the washing of salad crops for market.

1789. Anon.
Chicory growing in the fens.
Mim. Rep. Fm Econ. Br. **50**, 1954, pp. 12, from summary in *Mem. Univ. Camb. Sch. Agric.* **27**, 1956, pp. 11.

In 1952 chicory cost about the same to produce in the fens area as did sugar beet but gave a lower profit per acre. It is, however, a useful crop to grow, as it fits anywhere in the rotation, does not "draw" the land, thrives in soils unsuitable for cereals or sugar beet and, in particular, is not subject to eelworm.

1790. Wittwer, S. H.
Tendergreen—a new leaf lettuce for greenhouse forcing and early outdoor plantings.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **38**: 67-9, illus.

Tendergreen has arisen from hybridization between Bibb and Grand Rapids varieties. It is a good greenhouse lettuce for winter forcing, and is vigorous and productive in poor light conditions. In long day and high temperature conditions it bolts readily; its susceptibility to tip-burn is intermediate to that of its parents.

1791. Zink, F. W.
Pelleted seed cuts thinning time in half.
Amer. Veg. Gr, 1956, **4**(1): 28-9, illus.

Pelleting of lettuce seed permits the use of precision sowing equipment, so that sowing rate is reduced. This is of particular importance when expensive mosaic-tested seed is used. Emergence, however, is delayed. Savings in thinning time resulting from the use of pelleted seed varied between 6 and 11 man-hours per acre. Yields were increased by 9-19 crates per acre.—Univ. Calif. [See also *H.A.*, 26: 678.]

1792. Siciliano, S. A.
Insulating Yuma's lettuce.
Amer. Veg. Gr, 1955, **3**(5): 14, 17.

Vermiculite was applied over lettuce rows after seeding. More uniform and quicker germination was obtained, and yields of marketable heads were increased.

1793. Voegeli, L. J., and others.
Packing and shipping lettuce in fiberboard cartons and wooden crates—a comparison.
Market. Res. Rep. U.S. Dep. Agric. agric. Market. Serv. **86**, 1955, pp. 30, illus.

A survey of harvesting, packing and shipping costs for the 1952–53 lettuce harvests in California and Arizona showed that substantial savings were realized by dry-packing lettuce in fibreboard cartons in the field or packing sheds and vacuum-cooling it for shipment, as compared with ice-packing crates in packing sheds. Although part of the savings was absorbed by the higher costs of refrigeration required by the dry-packed commodity in transit, there remained a substantial net saving for the shippers in overall packing and shipping costs. [From authors' summary.]

1794. Anon.
Pre-packed lettuce shipping tests completed.
Pre-Pack-Age, 1955, **8**(11): 22, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2805.

Special wirebound pallet crates, each containing 250 to 300 heads of lettuce, were found satisfactory for rail journeys from Arizona to Philadelphia. All green leaves were left on the lettuces; they were vacuum-cooled immediately after packing, and then loaded into refrigerated vans. Temperatures on arrival at destination were 36° to 38° F. (2° to 3° C.). The lettuces were then packed in consumer-size cartons for dispatch to retailers.

1795. Ullrich, J.
Die Samenübertragung des Salatmosaiks und ihre Bedeutung für den Salatsamenbau.
(Seed transmission of lettuce mosaic virus and its importance in lettuce seed production.)
Züchter, 1956, **26**: 25-7, bibl. 9, illus.

Seed of summer lettuce from 36 sources was sown under aphid-free conditions. The occurrence of virus symptoms was noted at the 4- or 5-leaf stage of the seedlings, and symptoms were found in 22 groups. Virus infection amounted to 0·1–1·0% in 14 groups, 1·1–2·0% in 6 groups and more than 2% in 2 groups. At harvest the proportion of virus present had greatly increased. In general the transmission of lettuce mosaic from parent to seed is not more than 10%.—Biol. Bundesanst., Inst. Gemüsebau u. Unkrautforsch., Neuss-Lauvenburg.

1796. Miles, M.
What are these maggots on lettuce?
Grower, 1956, **45**: 159-61, illus.

Lettuces under Dutch lights have been sporadically

attacked by a white maggot which tunnels in the root system. The maggots are probably those of the chrysanthemum stool-mining fly (*Psila nigricornis*), and it is suggested that the plants are infected before planting. Insecticide application in the frames will not save the plants, and those with damaged roots should be discarded at the time of setting out.—Wye Coll., Kent.

1797. Jones, G. E., and Baker, L. A. E.
Some observations on the bacterial content of water in watercress beds.
J. appl. Bact., 1955, **18**: 415-24, bibl. 4.
With particular reference to the coli-aerogenes type. Notes are given on how pollution occurs and can be avoided.

Spinach.

(*See also* 1838c.)

1798. Roux, A.
Der Einfluss der Einhäusigkeit und der Standweite auf die Schossresistenz des Spinats. **(The effect of monoecism and spacing on bolting in spinach.)**
Saatgut-Wirtsch., 1955, **7**: 308-10, bibl. 2.
Selection for monoecism alone is not enough to retard bolting in spinach, and selection for late-bolting itself should also be made. In 2 morphologically identical varieties the proportion of monoecious types differed, but bolting occurred at the same time. In spacing tests it was shown that early thinning had no effect on the proportion of monoecious types. Later thinning produced great differences, especially in the smaller plants.

1799. Wilcox, J., and Howland, A. F.
Control of the pea leaf miner in southern California.
J. econ. Ent., 1955, **48**: 579-81, bibl. 2.
Excellent control of pea leaf miner (*Liriomyza langei*) on spinach, cos lettuce and beetroot was obtained with 1 or 2% parathion applied weekly at 15 lb./acre. EPN emulsion sprays gave excellent results in 2 tests. Dusts of EPN and Metacide generally gave good results. Spinach leaves were severely burnt by 20% toxaphene and 2·5% methyl parathion dusts in the absence of smog. In the presence of smog, 1% parathion and 2% EPN dusts intensified leaf scorching. Very good control of *Pegomya hyoscyami* on beet and spinach was obtained with dusts of parathion and EPN, alone or with DDT, and of NPD and demeton. —Ent. Res. Branch, Agric. Res. Serv., U.S.D.A.

Tomatoes, capsicums and eggplants.

(*See also* 1308, 1340, 1352, 1354, 1607, 1671, 1724, 1837a, i, k, o, r, 1939.)

1800. (Lock, F. W.)
New tomato called "Fidelity".
Comm. Gr, 1955, No. 3128, p. 1210, illus.
One parent of the new tomato is Potentate, which it resembles in general appearance, size of fruit and weight of crop. The new variety is extremely resistant to cladosporium.

1801. Magelli, E.
Il vero San Marzano. **(The true San Marzano tomato.)**
Sementi eletti, 1955, **1**(2): 10-16.
A well illustrated description of a famous tomato variety and of seven other similar varieties with which its seed is often found to be contaminated. They are in particular Fraschella, Barese or Pruno, Fiascone and 4 strains of Lampadina.

1802. Rick, C. M., Baughn, C. G., and Hall, B. J.
Three new hybrid tomatoes.
Calif. Agric., 1956, **10**(1): 4-5, 10, illus.
Three hybrid tomato varieties, at present known as UC Hybrids 2-H2, 8-H8 and 11-H11, which have arisen from crosses between male-sterile and fertile varieties, have been selected as showing promise for quality and early yield.—Univ. Calif., Davis.

1803. Young, P. A.
Curl, a mutant teratism of the tomato.
J. Hered., 1955, **46**: 243-4, bibl. 1, illus.
A bud mutant on a Stokesdale tomato plant produced a branch with curled leaves. Fruits showed dim yellowish meridian stripes in the skin. Such plants may have an ornamental value.—Texas agric. Exp. Stat., Jacksonville.

1804. Bonde, E. K.
The effect of various cycles of light and darkness on the growth of tomato and cocklebur plants.
Physiol. Plant., 1955, **8**: 913-23, bibl. 3.
Young tomato plants were grown under various cycles of alternating light and dark periods of equal length for 17 days. Growth as measured by increase in height, fresh weight, and dry weight was greatest under cycles of 4 hours of light and 4 hours of darkness. Growth was next best under 12-hour cycles, and the poorest growth took place under 2-hour cycles. [From author's summary.]—Calif. Inst. Technology.

1805. Vince, D.
Studies on the effects of light quality on the growth and development of plants. II. Formative effects in *Lycopersicon esculentum* and *Pisum sativum*.
J. hort. Sci., 1956, **31**: 16-24, bibl. 21.
When grown in light restricted to 1 of 3 broad divisions of the visible spectrum, the responses of tomato and pea plants were different. When the plants were grown at equal incident energy levels in each spectral region, total stem length, internode and leaf length increased in *Lycopersicon* with increases in wave-length; in *Pisum* var. Meteor total stem length and internode length decreased, and leaflet length increased, with increases in wave-length. In *Pisum* var. Alaska there was little difference in plants from any wave-length region. Plants grown in light of wave-lengths above about 500 mμ, especially tomato, showed leaf epinasty, this being most marked at wave-lengths above 600 mμ. In light of wave-lengths of less than 500 mμ the leaf blades were flat. The energy of the Hg-blue lines in unfiltered red lamps was sufficient to prevent leaf rolling in tomato. The total dry weight of plants was greatest in red light and in the complete spectrum, and least in

green and blue light. [From author's summary.]—Dep. Hort., Univ. Reading.

1806. Breazeale, E. L., and McGeorge, W. T.
Relation between electrical conductance and cation uptake by tomato plants.
Soil Sci., 1955, **80**: 375-80, bibl. 3, illus.

When a growing plant is connected to the negative pole of an electropode, the positive pole attached to the medium in which the plant is growing, and the plant subjected to specific cation voltages, there is a diurnal fluctuation in conductance within the tissue. The fluctuation in conductance parallels a fluctuation in uptake of cations. The fluctuation in conductance and cation uptake are properties of living tissue. [Authors' summary.]—Ariz. agric. Exp. Stat.

1807. Plaisted, P. H.
Suppression of tomato plant terminal growth by α-cyanocinnamic acids and related compounds.
Contr. Boyce Thompson Inst., 1955, **18**: 231-42, bibl. 16, illus.

Foliage sprays of α-cyano-2,4-dihalocinnamic acids applied to seedling tomato plants caused inhibition of stem elongation and rosetting of new growth. Activity of the α-cyanocinnamic acids was found to be correlated with substitution on the benzene ring.

1808. Allerton, F. W.
Ring culture ensures vigorous growth.
Grower, 1955, **44**: 1109-10, illus.
What you can save in steaming and watering.
Grower, 1955, **44**: 1464-5, illus.
It suits lettuce and carnations too.
Grower, 1956, **45**: 95-9, illus.

The principles of ring culture of tomatoes are discussed. Bottomless pots, of a bituminized composition, are filled with JIP compost and stood on an inert medium. Boiler ash was found to be the most satisfactory. The depth of the medium is not a critical factor; isolation from underlying border soil may be obtained by a polythene film. Liquid feeding is given weekly, and only 1 light watering between feeds was necessary. In commercial practice the use of ring culture means reduced amounts of soil to be sterilized, and an unskilled approach to watering. Management is simplified and increased rates of cropping have been obtained. In the third article the experience of some growers is reported. A summary of the main requirements for ring culture is given.

1809. Wynd, F. L., and Wildon, C. E.
The use of glass frit for the hydroponic culture of tomatoes.
Lloydia, 1955, **18**: 109-28, bibl. 10.

Tomato plants were grown in hydroponic cultures with a supporting medium of glass frit. Two control cultures were used, an absolute control of quartz gravel of the same particle size as the frit, and a frit control of quartz which was flooded with nutrient solution simultaneously with the frit culture. Frit-grown plants were a normal green colour at all pH levels of the nutrient solution, while frit control plants became distinctly chlorotic. Total Fe and Fe concentrations were higher in stems of frit-grown than in those of frit control plants, and these amounts increased with the pH values of the nutrient solution. Concentrations of Mn in the stems of frit-grown and their corresponding frit control plants were about equal at specific pH values, but decreased rapidly with increasing pH. In the leaves of frit control plants there was a greater concentration of Mn than in those of their corresponding frit-grown plants. Increasing pH values lowered Mn concentrations in both frit-grown and frit control plants. In stems of frit-grown plants the total amount of Mn absorbed was greater than in those of frit control plants, but the amounts were rapidly reduced with increasing pH of the nutrient. At specific pH values the total amounts of Mn in the leaves were about equal, but lessened as pH was increased. The Fe : Mn ratios were very much smaller in all parts of frit control plants than in frit-grown plants.—Mich. St. Coll., E. Lansing.

1810. Landrau, P., Jr., and Samuels, G.
Influence of fertilizers on the yield of the Plamar variety of tomatoes on a Coto clay. [Spanish summary ½ p.]
J. Agric. Univ. Puerto Rico, 1955, **39**: 77-83, bibl. 8.

In tests at the Isabela substation (1) The use of 100 lb. N per acre gave significantly higher yields of commercial tomatoes per acre than either none or 200 lb. N. (2) Phosphate fertilizers increased tomato yields, the highest yields being obtained with 200 lb. of P_2O_5 per acre. (3) There was no response to potash fertilizers. (4) The use of 20 tons of filter-press cake per acre gave significant increases in yields over the no-fertilizer treatment. (5) When 20 tons of filter-press cake were used combined with 100 lb. N and 200 lb. each of P_2O_5 and K_2O per acre, the yields obtained were superior to those when the filter-press cake or chemical fertilizer were used alone. (6) No yield increases were obtained with magnesium and boron additions to the N–P–K fertilizer applications. [From authors' summary.]

1811. Malcolm, J. L.
Manganese requirements of potatoes and tomatoes on marl soils.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 81-7, bibl. 4.

Tomatoes grown on a marl soil (pH 7·8) were supplied with 0, 25, 50 or 100 lb. MnO per acre per year after a high initial application. No visible symptoms of Mn deficiency or toxicity were observed during the 4-year period of the trial. Yields were quite satisfactory over the 4-year period, although the proportion of marketable fruit was low. Plots receiving 25 and 50 lb. MnO produced significantly more fruit than the controls, while plots receiving 100 lb. MnO produced significantly less.—Fla Sub-trop. Exp. Stat. Homestead.

1812. Malavolta, E., and Pellegrino, D.
Estudos sôbre a distribuição do radiozinco no tomateiro (*Lycopersicum esculentum*). **(Studies on the distribution of radioactive zinc in the tomato plant.)** [English summary 1 p.]
An. Esc. sup. Agric. Queiroz, 1954, **11**: 77-84, bibl. 7, illus.

The results of the experiments were: (1) All parts of tomato seedlings grown in a nutrient solution containing $Zn^{65}Cl_2$ became radioactive, including the

cotyledons, but the greatest concentration was in the roots. (2) In older plants supplied through the roots (*a*) translocation from older to younger leaves took place, and (*b*) 66% of the Zn^{65} supplied was absorbed, but 53% remained in the roots and only 5·6% was translocated to younger organs. (3) Of Zn^{65} applied to the leaves of older plants, 24·2% was absorbed and 13·7% was translocated to other organs including the roots.

1813. Lamb, J. G. D.
A survey of soil conditions in tomato houses in Ireland.
J. Dep. Agric. Dublin, 1953-54, **50**: 129-50, bibl. 16.

A soil survey in tomato houses in 9 Irish counties has shown that excessive levels of available nutrients are common, and these are generally associated with Mg deficiency and declining yields. [See also *H.A.*, 25: 4033.]

1814. (Littler, A. E.)
Soil management in greenhouses.
A.R. B.C. Dep. Agric., 1954, 1955, pp. 34-5.

Toxic conditions in tomato houses were found to be due to a high concentration of salts in the soil and a low pH. Considerable benefit resulted from the application of a 3-inch mulch of sawdust or from leaching, provided the leaching process was not prolonged to the extent that it removed too much of the plant food.

1815. van den Ende, J.
De watervoorziening van tomaten. (**The water supply of tomatoes.**) [English summary ⅔ p.]
Med. Dir. Tuinb., 1955, **18**: 866-82, 904-17, 932, bibl. 36, illus.

The author records his impressions gained on a study tour in England and Guernsey. Experiments with trickle irrigation are described.

1816. Hudson, J. P.
The shape of the wetting cone will help.
Grower, 1956, **45**: 99-103, illus.

Trickle irrigation was applied to tomato plants, with lines either between or along the rows. There was little difference in fruit yield or quality under the 2 systems. Excavations during the growing season have shown that the water from the nozzle tends to flow more strongly downwards than outwards so that a cone is formed. During the first few weeks of growth increasing amounts of water should be applied at each irrigation to keep pace with root growth, but after about 8 weeks the amount of water should be stabilized. The greatest concentration of roots appeared to develop around the edge of each cone of wetting, while extra dense root growth was formed where 2 cones overlapped below the soil surface. It is suggested that trickle nozzles should be spaced according to the shape of their wetting cones and not relative to plant spacing. At the end of the season salts had become concentrated in the main rooting areas.—Nottingham School of Agric., Sutton Bonington.

1817. Sharp, R. B.
The growth of mucus-forming bacteria in drip-feed irrigation lines.
J. agric. Engng Res., 1956, **1**(1): 83-8, bibl. 1, illus.

In experiments on a system used for the supply of water containing nutrient solution to a tomato crop: (1) Mucus growth was removed by pumping sodium hypochlorite (10–14% available Cl) through the pipes and then flushing with high-pressure water. (2) Mucus growth was subsequently prevented by supplying chlorine at 0·1 to 0·05 p.p.m. to the irrigation water. Growth can also be prevented by the addition of copper sulphate at 5 p.p.m. to the irrigation water, but this may injure the tomatoes. The use of metallic silver as a preventive was investigated.—Nat. Inst. agric. Engng, Silsoe, Beds.

1818. Jackson, W. T.
The role of adventitious roots in recovery of shoots following flooding of the original root systems.
Amer. J. Bot., 1955, **42**: 816-19, bibl. 4.

The presence of adventitious roots did not prevent injury to Marglobe tomato plants when the original root system was flooded, but leaf epinasty was less and shoot growth was greater than in flooded plants without adventitious roots. Shoot growth was resumed if adventitious roots were allowed to develop after flooding. Removal of these roots and sealing the cut stumps almost prevented shoot growth. In sunflower plants the response was similar.—Yale Univ., New Haven, Conn.

1819. Hall, C. B., and Dennison, R. A.
Influence of nutrition on tomato fruit disorders.
A.R. Fla agric. Exp. Stats, 1954, p. 108.

Vascular browning of tomato fruits was found to be associated with the following treatments: shade, mist, soil compaction and cool night temperatures. [See also *H.A.*, 25: 2966.] Mineral analyses showed that affected fruits were higher in Ca, K, Mg and P than healthy fruits. The oxalic acid content (fresh-weight basis) of the rachises, stems and roots of tomato plants increased from the time the flower buds became visible to fruit set of the first truss. During this time the oxalic acid content of the leaves decreased.

1820. Gäumann, E., Naef-Roth, S., and Kern, H.
Über die chelierende Wirkung einiger Welketoxine. III. Die Verschiebungen der Toxizität durch steigende Absättigung mit Eisenionen. (**The chelating action of some wilt toxins. III. Changes in toxicity due to increasing saturation of the chelating agent with Fe ions.**) [English summary 2½ pp.]
Phytopath. Z., 1955, **24**: 373-406, bibl. 12.

Studies were made on the effect of increasing amounts of Fe ions on the toxicity of chelating agents (Komplexon III and lycomarasmin) to young tomato cuttings. The pathogenic effect caused by the iron complex of the chelating agent was not affected by the valency of the Fe-ions. Injury to tomato cuttings by Komplexon III, to which increasing amounts of Fe were added, may be represented by a minimum curve. When increasing amounts of Fe were added to a given amount of lycomarasmin its toxicity increased up to tenfold. When increasing amounts of Komplexon III or lycomarasmin were added to a given amount of Fe, each gave identical

injury curves on tomato. In transpiration experiments Komplexon III disturbed the water balance in a different way from lycomarasmin.—Eidg. tech. Hochschule, Zürich. [For Part II see *H.A.*, 25: 2978.]

1821. Dale, W. T.
Virus diseases of solanaceous crops in Trinidad.
Trop. Agriculture Trin., 1956, **33**: 35-50, bibl. 31, illus.
Information is given on the symptoms, host ranges, transmission, economic importance and control of TMV, cucumber mosaic, pepper vein-banding, egg-plant mosaic and tomato twisted-leaf diseases, and on virus-like symptoms caused by mites in various solanaceous crops.—I.C.T.A., Trinidad.

1822. Limasset, P.
Observations sur les maladies à virus de la tomate dans le Midi et le Sud-ouest de la France. **(Observations on the virus diseases of the tomato in southern and south-western France.)**
Progr. agric. vitic., 1956, **145**: 67-72, bibl. 1.
Investigations in 1955 showed that tobacco mosaic, cucumber mosaic, potato virus X and tomato spotted wilt are all widespread.

1823. John, C. A., and Sova, C.
Incidence of tobacco mosaic virus on tomato seed.
Phytopathology, 1955, **45**: 636-7, bibl. 6.
Seed is the source of infection with TMV, a prevalent disease of commercial tomato fields in Ohio. There was no great loss of infectivity during seed storage by normal methods, but in samples removed from large bags and stored in paper envelopes under laboratory conditions from February to October the virus had apparently disappeared by October, possibly, it is thought, owing to greater exposure to air. Seed treatment with 10% trisodium phosphate for 15 minutes inactivated the virus and had no adverse effect on viability.—H. J. Heinz Co., Pittsburgh, Pa.

1824. Darby, J. F.
Control of diseases of unstaked tomatoes grown on the sandy soils of south Florida.
A.R. Fla agric. Exp. Stats, 1954, pp. 244-5.
Streptomycin and terramycin gave no benefit in control of bacterial spot (*Xanthomonas vesicatoria*) in large-scale field trials. Grey mould (*Botrytis cinerea*) and ghost spot were significantly reduced by dichlone. [See also *H.A.*, 25: 2974.] A mixture of dichlone and zineb used throughout the season significantly reduced both grey mould and ghost spot, and gave excellent control of late blight (*Phytophthora infestans*).

1825. Mohanty, U. N., and Mohanty, N. N.
Cercospora leaf mould of tomato.
Sci. and Cult., 1955, **21**: 269-70, bibl. 2, illus.
An outbreak of leaf mould due to *Cercospora fuligena* on the indigenous tomato varieties Red Ball and Marglobe at the State Agricultural Research Station, Bhubaneswar, Orissa, in January 1955 is the first record of this disease in India. In preliminary control experiments 4–4–50 bordeaux mixture was better than the other copper products tested.—Dep. Agric., Orissa, Cuttack.

1826. (Connecticut Agricultural Experiment Station.)
New control for damping off.
Amer. Veg. Gr, 1955, **3**(10): 15, illus.
Promising results have been obtained with oxyquinoline compounds in control of damping off (*Rhizotonia* spp.). Applications to tomatoes and lettuces have given good results.

1827. Hely, P. C.
Control of tomato pests.
Agric. Gaz. N.S.W., 1955, **66**: 441-3, illus.
A mid-season crop of Marglobe tomatoes was sprayed with DDT, alone or in combination with nicotine sulphate, or 2 types of parathion emulsion. Sprays of 0·025% DDT gave satisfactory control of tomato caterpillar (*Heliothis armigera*), potato moth (*Gnorimoschema operculella*), jassids and green vegetable bug (*Nezara viridula*), and reduced losses from bronze wilt. The addition of nicotine sulphate to DDT appeared to have no advantage. Parathion sprays at 0·01% were less effective than DDT for insect control.

1828. Wene, G. P.
Effect of some organic insecticides on the population levels of the serpentine leaf miner and its parasites.
J. econ. Ent., 1955, **48**: 596-7, bibl. 3.
Liriomyza subpusilla has recently developed as a major pest of peppers, cantaloupes, tomatoes and blackeyed peas. Dusts containing DDT, aldrin and TDE reduced the population of its parasites, and thus accentuated the leaf miner problem. Toxaphene reduced populations of leaf miner parasites, but also reduced leaf miner infestation. In high volume spray experiments parathion reduced the numbers of both leaf miner and its parasites. Lindane, endrin and dieldrin reduced the parasite population, but were not so toxic to the parasites as parathion. A large scale experiment showed that parasites were effective in controlling leaf miner.—Texas agric. Exp. Stat., Wesco.

1829. Chamberlain, W. F., and Cochran, J. H.
Control of the tomato fruitworm in South Carolina.
J. econ. Ent., 1955, **48**: 518-21.
DDT, DDD, Dilan and dieldrin gave good control of tomato fruit worm (*Heliothis armigera*). Results with toxaphene were variable, while methoxychlor, aldrin and parathion generally gave poor control. Dusts and sprays gave equally good control; for DDT a rate of 1½ lb. actual ingredient per acre as a spray, and of 2½ lb. per acre as a dust, gave good results. The addition of sticking agents increased control by about 80%, but excellent commercial control was obtained without them. With the advancing season the effectiveness of the control programme slightly decreased. No insecticide tested as a wettable powder or as an emulsion caused injury to tomato plants under field conditions. —S. Carolina Exp. Stat., Clemson.

1830. Rheinhold, J., and Goetsch, W.
Die Bestimmung der Sortierung und der Zeitigkeit in gärtnerischen Ertragsversuchen. **(The estimation of grading and earliness in horticultural yield trials.)**
Züchter, 1956, **26**: 27-33, bibl. 4.
A method of analysing tomato fruit yields is proposed,

by which the economic value of grade and time of harvest, as well as of weight, may be evaluated.—Inst. Gartenbau, Grossbeeren, Berlin.

1831. Avila, A., and Castronovo, A.
Nuevos estudios sobre contenido de materia seca en frutos de tomate. **(New studies on the dry matter content of tomato fruits.)**
Rev. Invest. agríc. B. Aires, 1955, **9**: 219-28, bibl. 2.
In refractometric studies on the fruits of the 157 varieties and forms comprising the tomato collection at the Plant Technology Institute, 147 were found to have refractive indexes (RI) of 4·00–5·99 and 10 of 6·00 or more. Morphologically indistinguishable plants of the same variety sometimes differed significantly in R.I. but there appeared to be a gradual increase in the upper trusses beginning with the 5th, which differed significantly from the first 4. Self- and cross-pollinated fruits on the same plant differed significantly or highly significantly in RI in 6 out of 10 cases. The RI of the mother plant was related to the degree of difference in RI between self- and cross-pollinated fruits.

1832. Borenstein, B., Stier, E. F., and Ball, C. O.
Determination of galacturonic acid in tomatoes and its changes on storage.
J. agric. Food Chem., 1955, **3**: 1041-4, bibl. 9.
Methods of determination and separation of galacturonic acid are described. In tomatoes stored at 42° F. for from 1 to 41 days no appreciable differences in galacturonic acid contents were observed.—N.J. agric. Exp. Stat., Rutgers Univ., New Brunswick.

1833. (D.S.I.R., London.)
Tomatoes can be stored up to 14 days.
Grower, 1955, **44**: 1399.
The life of tomatoes was extended by 10–14 days by storage at 53° F. Sound fruit, picked at the turning stage, was stored in slatted trays or boxes.

1834. Corrales Macedo, A.
Sistemas de sembrio en el cultivo del ají. **(Methods of sowing capsicum.)**
Bol. trimestr. Exp. agropec. Lima, 1955, **4**(1): 7-11.
Direct sowing by machine in drills or by hand at 6–8 seeds per site was compared with transplanting nursery plants, the direct-sown seedlings being later thinned to the planting spacing. The results were: (1) Maturation was 3 weeks earlier with direct sowing. (2) Machine sowing gave a yield of 7,000 kg. per ha. compared with 5,700 with the other methods. (3) Deaths from wilt and other causes were greater with transplanting, reaching a total of 91 out of 324 plants compared with 22 and 42 with machine and hand sowing respectively.—Estac. exp. agríc. La Molina.

1835. Ozaki, C. T., and Hamilton, M. G.
Bronzing and yield of peppers as influenced by varying levels of nitrogen, phosphorus and potassium fertilization.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 185-9.
The effect of 3 levels of N, P and K on yield and quality of sweet peppers was studied. All treatments resulted in a heavy fruit set. Bronzing symptoms were observed shortly after the first harvest. Young bronzed leaves had a lower K content than green mature leaves from the same plant. Increasing N levels resulted in increased bronzing; increasing K levels gave decreased bronzing. The K content of fruits was increased by the higher K levels. Significant increases in yield and quality were obtained by the 200 lb. N or K_2O applications. Responses to increased N were obtained at the higher K levels, and K responses were obtained at the higher N levels. Plant size was affected by K levels.—Everglades Exp. Stat., Belle Glade.

1836. Corrao, A.
Ricerche sul contenuto pectico dei frutti di *Solanum melongena* L. **(Pectic content of *Solanum melongena* fruits.)** [English summary 12 lines.]
Ann. Sper. agrar., 1956, **10**: 269-74, bibl. 10.
In 3 eggplant varieties the pectin content of the fruit dry matter was 3·2–5·1% by volume as pure pectin and 4·48–9·11% by weight as calcium pectate. The esterification rates were determined.—Ist. Indust. agrar., Univ. Palermo.

Noted.

1837.

a Azmy, Y. H.
Tomato growing. [In Arabic.]
Mon. agr. Bull. (Cairo), 1955, **14**(6): 12-18, from abstr., in *Bull. sci. tech. Docum. Cent. Cairo*, 1955, Vol. **1**, No. 3, Part 2, No. 1–100491.
In Egypt.

b Banga, O. (Editor.)
8e beschrijvende rassenlijst voor groentegewassen [inclusief vroege aardappel, aardbei, tabak, geneeskrachtige en aromatische kruiden]. **(8th descriptive variety list of vegetable crops [including early potatoes, strawberries, tobacco, medicinal and aromatic herbs].)**
[*Publ.*] *Inst. Vered. Tuinbouwgew. Wageningen*, 1956, pp. 168, illus., fl. 1.75.

c Barnes, D., and Pacheco M., F.
La producción comercial de frijol bajo riego. **(The commercial production of beans under irrigation.)**
Foll. divulg. Mexico Sec. Agric. Ganad. Ofic. Estud. **14**, 1954, pp. 21, from abstr. in *Biol. Abstr., Sect. D*, 1956, **30**, No. 2606.

d Bateman, J. K.
Lettuce and celery under glass.
Agriculture, Lond., 1956, **62**: 485-7.

e Bremer, H.
Die Mehlkrankheit der Zwiebeln (*Sclerotium cepivorum* Berk.). Ein Sammelbericht. **(White rot of onions. A summary.)**
Z. PflKrankh., 1956, **63**: 9-11, bibl. 19.
Biology and control.

f BRIEN, R. M., AND OTHERS.
Diseases and pests of peas and beans in New Zealand and their control.
Bull. D.S.I.R.O., N.Z., **114**, 1955, pp. 91, illus.
Of every kind.

g BUXTON, E. W.
Fusarium diseases of peas.
Trans. Brit. mycol. Soc., 1955, **38**: 309-16, bibl. 28, illus.
Fusarium oxysporum, *F. oxysporum* var. *pisi* and *F. solani*.

h CARR, A. R.
Cabbage varieties in southern Queensland.
Qd agric. J., 1955, **81**: 206-10, illus.

i DAVEY, J. B.
The Grosse Lisse tomato.
Qd agric. J., 1955, **81**: 273-6, illus.

j FISHER, K. H., AND DODDS, M. L.
Reduced and total ascorbic acid values of thirty-four foods.
Food Res., 1955, **20**: 247-9, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2885.
Including frozen vegetables, fruit and fruit juices.

k GOETSCH, W.
Der Gemüsepaprika-Anbau verdient mehr Beachtung. **(Capsicum culture deserves more attention.)**
Dtsch. Gartenb., 1955, **2**: 307-9, illus.
Culture and varieties recommended for Germany.

l HEEMSTRA, J.
The use of vegetative reproduction in the breeding of cross-fertilizing plants. [Dutch summary.]
Euphytica, 1955, **4**: 277-39, bibl. 3, illus.
Including experiments with cabbage.—Wiersum Seed Co., Groningen.

m JONES, I. D., ETCHELLS, J. L., AND MONROE, R. J.
Varietal differences in cucumbers for pickling.
Food Technol., 1954, 8(9): 415-18, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **ARS-72-3**, Suppl. 1, 1955, No. 72.

n KEFFORD, R. O.
Production of healthy crucifer seedlings.
J. Agric. Vict., 1955, **53**: 494-6, illus.
Control of diseases, pests and weeds, drainage and nutrition.

o KELBERT, D. G. A., AND WALTER, J. M.
Manalee, a disease-resistant early tomato.
Circ. Fla agric. Exp. Stat. **S-72**, 1954, pp. 8, illus.

p KHOSHOO, T. N.
Cytotaxonomy of Indian species of *Citrullus*.
Curr. Sci., 1955, **24**: 377-8, bibl. 3, illus.
C. vulgaris, *C. colocynthis* and *C. vulgaris* var. *fistulosus*.

q KINPYO, T., AND KAMIYA, S.
Applied and comparative biochemical studies of *Allium* in Japan. V. Some changes of chemical composition of onion in storage pre-treated with maleic hydrazide. [Japanese, with English summary.]
Rep. Fac. Agric. Shizuoka Univ. **3**, 1953, pp. 178-96, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2892.

r KOEK, P. C.
Een nieuwe verwelkingsziekte bij tomaat, *Solanum lycopersicum* L., veroorzaakt door *Pseudomonas solanacearum* Smith. **(A new bacterial wilt disease of tomatoes caused by *Pseudomonas solanacearum*.)** [English summary 6 lines.]
Jaarb. PlZiekt. Dienst, Wageningen, 1954/1955, pp. 205-8, illus.

s MEENAKSHISUNDARAM, D.
A note on some floral abnormalities in the pumpkin.
South Indian Hort., 1955, **3**: 78-9, bibl. 4, illus.
Hermaphrodite flowers and naked ovules.

t MICHIGAN STATE COLLEGE, DEPARTMENT OF HORTICULTURE.
Growing pickling cucumbers in Michigan.
Ext. Folder Mich. St. Coll. **F-191**, 1955, 1 folded sheet.

u MICHIGAN STATE COLLEGE, DEPARTMENT OF HORTICULTURE.
Cauliflower and broccoli production in Michigan.
Ext. Folder Mich. St. Coll. **F-192**, 1955, 1 folded sheet.

v NAVIA, J. M., AND OTHERS.
Nutrient composition of Cuban foods. I. Foods of vegetable origin.
Food Res., 1955, **20**: 97-113, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2888.

w OWNBEY, M., AND AASE, H. C.
Cytotaxonomic studies in *Allium*. I. The *Allium canadense* alliance.
Res. Stud. Wash. St. Coll. Pullman, 1955, **23**(4), Monog. Suppl. **1**, pp. 106.
For previous studies by the first author on *Allium* see *H.A.*, 20: 2820 and 2821.

x PACI, P.
Contributo allo studio delle cultivar di pisello coltivate presso il Centro Miglioramento Piante Ortofrutticole di Firenze. **(Contribution to the study of the pea varieties grown at the Horticultural Plant Breeding Centre at Florence.)** [English summary 7 lines.]
Riv. Ortoflorofruttic. ital., 1955, **39**: 503-21, bibl. 20, illus.
A description of 15 Italian and foreign pea varieties under trial at Florence.

y PHILIPP, F.
Ergebnisse der Gemüsesortenversuche. **(Results of vegetable variety trials.)** [German, English, French and Spanish summaries.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 285-319.
Beans, onions, radishes, parsley, lettuces and cucumbers in Austria.

z POTTER, F. G.
Vegetables for the connoisseur.
J. roy. hort. Soc., 1956, **81**: 94-101, illus.
For growing in Britain.

1838.

a SUNDARARAJ, D. D., AND BALASUBRAMANYAM, G.
Abnormal flowers in radish, *Raphanus sativus* Linn.
South Indian Hort., 1955, **3**: 76, bibl. 2, illus.
Adherence of stamens to petals and a sepal.

b SYKES, S. M., AND TINSLEY, I. J.
Preservation of brassicas by freezing.
Fruit Pres. Quart., 1955, **15**: 69-71.
Varieties of broccoli, brussels sprouts and cauliflower suitable for freezing are listed.

c WEBB, R. E.
Cotyledonary inoculation, a method for screening spinach for blight resistance.
Phytopathology, 1955, **45**: 635, bibl. 1.
Developed at the Plant Industry Station, Beltsville, Md.

d WOLF, E. A., AND HILLS, W. A.
Seminole—a new disease-resistant, green, round-podded bush bean.
Circ. Fla agric. Exp. Stat. **S-73,** 1954, pp. 6, illus.

TOBACCO.

General.

(*See also* 1314, 1837b, 1903a, b, d, g, h, 2151, 2320, 2337, 2340h.)

1839. VAN LEER, R.
La culture du tabac au Lomami. **(Tobacco growing in Lomami.)**
Bull. Inf. I.N.É.A.C., 1955, **4**: 357-403, bibl. 2, illus.
A brief history of tobacco growing in the Belgian Congo is followed by information on the growing of cigar wrapper and air-cured, flue-cured and dark, fire-cured cigarette tobaccos in Lomami. The subjects covered include rotation, nursery and field techniques, harvesting, curing and fermentation, grading, packing, yields and research including introductions and varietal, cultural, manurial and rotational trials.

1840. TURCOT, C.
La culture du tabac jaune. **(Yellow tobacco growing.)**
Rev. d'Oka, 1955, **29**: 110-13.
This brief historical sketch of the Canadian yellow tobacco industry includes some production figures.

1841. ORTIZ, R., G.
Programa general de trabajos del Instituto de Fomento Tabacalero. **(General programme of work at the Institute for the Promotion of Tobacco Growing [in Colombia].)**
Agric. trop. Bogotá, 1955, **11**: 321-3.
The research programme is outlined. It covers investigations on soils including manuring, climate, breeding and selection, introductions, nurseries, field practice including disease and pest control, and processing.

1842. AMARELL, H.
Über den Einfluss der Klimafaktoren auf die Qualität des Tabaks. **(The effect of climate on tobacco quality.)**
Ber. Inst. Tabakforsch. Dresden, 1955, **2**(2): 9-26.
In East Germany no marked relation has been found between average rainfall and leaf quality. The microclimate of the shade tent is favourable to the water economy of the plant, and leaves grown under these conditions are suitable as wrappers.

1843. AR-RUSHDI, A. H.
The use of radioactive phosphorus in determining pollen-tube penetration in tobacco.
J. Genet., 1956, **54**: 23-6, bibl. 4, illus.
Autoradiographs of pollen-tube penetration in styles of tobacco flowers showed close agreement with direct observation.—Univ. Calif., Berkeley.

Varieties and breeding.

(*See also* 1903k.)

1844. (LOVVORN, R. L.)
Station releases tobacco variety.
Ext. Fm-News, Raleigh, 1955, **41**(4): 3.
Dixie Bright 244, a Dixie Bright 101 × (Dixie Bright 102 × Bottom Special) cross recently released by North Carolina Experiment Station, is intermediate in resistance to black shank between Dixie Bright 101 and 102 and approximately equal to Dixie Bright 101 in resistance to Granville and fusarium wilt. Its yield and acre values are about 20% above those of Dixie Bright 101.

1845. TYAGI, O. P.
Augmentation and chorisis in *Nicotiana tabacum* L.
Sci. and Cult., 1956, **21**: 378-9.
Instances of these 2 phenomena, namely, numerical abnormalities in one or more whorls, were observed in flowers of several varieties at the Government Agricultural College, Kanpur.

1846. ENDEMANN, W.
Probleme der Resistenz-Züchtung bei Tabak. **(Problems of tobacco breeding for resistance.)**
Ber. Inst. Tabakforsch. Dresden, 1955, **2**(2): 57-76, bibl. 22, illus.

From the literature and from the author's own studies it is apparent that the response of tobacco varieties to black-rot (*Thielavia basicola*) varies from slight to extreme susceptibility. The differences in degree of susceptibility of the varieties tested are discussed. The use of the variety Ambalema and of *Nicotiana glutinosa* in breeding for tobacco mosaic resistance is described. Symptoms of brown rib are described; a few varieties have been found to be resistant.

1847. Wolf, F. A.
Production of Turkish or oriental tobaccos having tolerance to black shank.
Agron. J., 1956, **48**: 40-1, bibl. 1.

In 1949 tolerant flue-cured varieties were crossed, as pollen parents, with 3 desirable oriental types. Each of the progenies from selections among the F_2 has exhibited within itself different levels of tolerance, indicating that multiple factors or genes are involved. —Dep. Bot., Duke Univ., Durham, N.C.

1848. Adsuar, J., and López Matos, L.
Reaction of some *Nicotiana* species to the pepper- and common tobacco-mosaic viruses.
[Spanish summary ⅓ p.]
J. Agric. Univ. Puerto Rico, 1955, **39**: 168-71, bibl. 2.

TMV and pepper mosaic virus are the most important viruses in the filler tobacco districts of Puerto Rico. Of 22 *Nicotiana* species inoculated, *N. glauca* was the only one resistant to both viruses; *N. tomentosiformis* and *N. otophora* remained symptomless when inoculated with pepper mosaic and *N. acuminata* and *N. bigelovii* remained symptomless when inoculated with TMV.

1849. Engle, H. B.
Wild-fire mosaic free cigarleaf tobacco on trial.
Sci. for the Fmr, 1955, **3**(2): 6-7, illus.

Commercial varieties of Pennsylvania broadleaf or seedleaf tobacco were bred with *Nicotiana longiflora* and *N. glutinosa* to introduce wild-fire and mosaic resistance. Selections have been made for quality as well as for resistance.—Field Res. Lab., Landisville, Pa.

1850. Alcaraz Mira, E.
La resistencia del mosaico ordinario (*Marmor tabacci* var. *deformans*) (Holmes) de las variedades de tabaco. (**Tobacco varietal resistance to common mosaic.**)
[English summary 1 p.]
Bol. Inst. Invest. agron. Madrid, 1955, **15**: 439-54, bibl. 16.

In field and glasshouse experiments at the Instituto de Biología del Tabaco (IBT) on resistant and susceptible varieties resistance was shown by (1) IBT hybrids owing their resistance to the complex of genetic factors *a* in the Ambalema variety, (2) varieties owing their resistance to the factor N in *Nicotiana glutinosa*, and (3) IBT hybrid 20, *N. tabacum* var. Precox and Java-Isère × Cabot, which are believed to owe their resistance to part of the *a* complex found in Ambalema. The method of infection used is described. Five grades of leaf symptom are recognized.

Sowing and planting.

1851. Clark, F.
Permanent seed-beds for tobacco plants.
A.R. Fla agric. Exp. Stats, 1954, p. 47.

Chicken manure, sheep manure, peat moss, Florahome peat and vermiculite were added to plots treated with methyl bromide. Chicken manure produced 25,000 transplants per 100 sq. yds. at the first pulling, while about 17,000 transplants per 100 sq. yds. were produced by the other materials. Chlorobromopropene-55 and/or allyl alcohol were tested for weed control, and both gave good results. Ferbam at 15% and zineb at 10% both effectively controlled blue mould.

1852. Shaw, L., and Welch, C. D.
Burley tobacco plant bed studies.
Bull. N.C. agric. Exp. Stat. **395**, 1955, pp. 27, bibl. 9, illus.

Fertilization and soil management practices were studied in relation to plant stand and production of tobacco plants. Plant stands were generally better after bare fallow than after a cover crop of soybeans. Applications of N, P_2O_5 and/or K_2O did not improve plant stands. The use of cottonseed meal as a partial source of N sharply reduced plant stands, but there was no effect from the use of chemical sources of N. Ammonium nitrate and urea were about equal as sources of N for plant production, and were more effective than sodium nitrate or cottonseed meal. Less N was needed in fertilizer applications after turning-in the cover crop than after bare fallow. There was a marked effect of phosphate application on plant production. Building up the level of soil P by fertilizing soybeans was a satisfactory method of providing phosphate. With the same fertilization just before sowing, plant production was generally better on soil where soybeans had been fertilized and turned-in in the previous summer than it was following bare fallow.

1853. Weidemann, C.
Zur Frage des Einflusses der Satzzeit auf Entwicklung und Ertrag des Tabaks. (**The effect of time of planting out on development and yield of tobacco.**)
Ber. Inst. Tabakforsch. Wohlsdorf-Biendorf, 1954, **1**: 45-53, bibl. 4.

In 4 years' trials with Havana 2c and Virgin Gold A there was no significant difference in yields as between plants set out at the beginning and those set out in the second half of May. Plants set out in mid-June showed a clear reduction in yield. In large-scale plantings, setting out of the plants could be started at the beginning of May, when, provided they were sufficiently hardened off, a night temperature of −3° C. was not injurious. For small-scale plantings setting out in the second half of May is desirable for the best yield and quality.

1854. Hutcheson, T. B., Jr., and Woltz, W. G.
Investigations of the role of starter solutions in flue-cured tobacco production.
Tech. Bull. N.C. agric. Exp. Stat. **112**, 1955, pp. 20, bibl. 13.

Experiments showed that, in general, plain water is as good as or better than solutions containing N, P or K for transplanting flue-cured tobacco.

1855. Weidemann, C.
(The effect of spacing on yield, quality and labour requirements in tobacco growing.)
Ber. Inst. Tabakforsch. Dresden, 1955, **2**(1): 30-50, bibl. 8, illus.

Several years' trials have shown that with wider spacing total yields dropped, while individual plant production and the number of commercially utilizable leaves per plant increased. Burning quality was only slightly affected by spacing. More labour was required for close planting, but the higher wages were compensated for by better yield and finer leaves. By planting in double or treble rows mechanical cultivation was possible. The use of lathes in preparing leaves for flue-curing, in comparison with stringing, gave a 50% reduction in labour.

Nutrition and soil management.

(*See also* 1350, 1353, 1690, 1695, 1903f.)

1856. Barrett, A. E.
The fertilization of tobacco.
Progr. Rep. Illustration Stats Div. 1948/53, Central Experimental Farm, Ottawa, 1955, p. 23.

In experiments at St. Jacques, Quebec, in 1945/53 cigar tobacco received a 5–8–10 fertilizer at 750 or 1,000 lb. with or without 0, 5 or 10 tons farmyard manure per acre. Heavy applications of either fertilizer or manure gave a slight benefit except when accompanied by heavy applications of the other. The best treatment was 10 tons of farmyard manure plus 750 lb. of fertilizer.

1857. Clark, F., Harris, H. C., and Bledsoe, R. W.
Fertilization and culture of flue-cured tobacco.
A.R. Fla agric. Exp. Stats, 1954, pp. 48-50.

The combination of $\frac{2}{3}$ mineral N and $\frac{1}{3}$ organic N was better than all mineral sources of N for fertilization in 1954. MH 30 gave better control of suckers than mineral oil. Basal suckers grew more vigorously on non-irrigated tobacco than on irrigated plants. Fumigation with EDB-75 or EDB-85 gave satisfactory nematode control, and yields from fumigated plots were higher than those from non-fumigated plots. [See also *H.A.*, 25: 1813.]

1858. Bolton, A.
Experiments on tobacco-seed production.
Emp. J. exp. Agric., 1955, **23**: 240-3, bibl. 3.

Experiments on tobacco-seed production over 3 seasons have shown that "trimming" seed heads and "reaping" leaf greatly reduced seed yields and crop value with no compensating increase in quality of seed produced. Nitrogen markedly increased seed production, the optimum application being 60 lb. per acre. No response in seed yield was obtained by increasing either P_2O_5 or K_2O applications above 100 lb. per acre. Seed yields were somewhat lowered by MgO applications, and by close spacing. [See also *H.A.*, 25: 3011.]

1859. Garmany, H. F. M.
Some notes on recent experiments with Turkish tobacco.
Rhod. Tobacco, 1955, No. 11, pp. 30-1, illus.

The chief results and conclusions are: (1) The same fertilizer treatment of seedbeds as for flue-cured tobacco is satisfactory. (2) Adding insecticide to the transplanting water has ensured good stands. (3) A spacing of 18 × 9 in. appears to be better than 18 × 12 in. (4) Higher P and K are required than with flue-cured tobacco. (5) The application of 20 lb. MgO per acre as magnesite or dolomite is beneficial. (6) Broadcasting fertilizer is preferable to banding, and split application and top dressing are not recommended. (7) Planting should take place towards the end of the rains, normally in the first half of February. Brief notes are given on sun-curing and bulking.—Tobacco Res. Bd Rhod. Nyasaland.

1860. Stinson, F. A.
Nutrients travel in tobacco at different speeds.
Rhod. Tobacco, 1955, No. 11, pp. 12-13.

The results are given of (1) an experiment in which the N, K, P and Mg contents were determined of the top leaf of seed plants (not topped or suckered until the seed was ripe) with lower leaves reaped and unreaped, and (2) a comparison of the average K, N and Mg contents of the lower, middle and upper leaves of the above-mentioned seed plants which received very high N, and of those of plants fertilized, topped and suckered for leaf production. The conclusions are: (1) If N appears to be excessive at topping time it is better to top higher but not later. (2) In topping a stand it is better to top smaller plants lower according to their size at the same time as the larger ones than to top them a few days later. (3) Under-sized, damaged and over-ripe leaves can, if left on the plants, serve to furnish nutrients to the remaining leaves.—Tobacco Res. Bd Rhod. Nyasaland.

1861. Myers, J. M.
Fertilization and culture of flue-cured tobacco.
A.R. Fla agric. Exp. Stats, 1954, pp. 39-40.

Low, medium and high irrigation levels were maintained in tobacco plots. The medium level was found to correspond with the average daily water consumption of tobacco. No differences due to treatment were apparent in yield or gross value, but the medium level of irrigation produced a larger quantity of high quality tobacco. At 10,000 plants per acre yields and gross values were significantly higher, but amounts of high quality tobacco were lower, than at 7,500 plants per acre.

1862. Bates, T. E., and McDonald, I.
Weeping lovegrass is outstanding.
Rhod. Tobacco, 1955, No. 11, p. 25.

The chief results of experiments on 3-year rotations are: (1) Tobacco following two years of Weeping lovegrass, *Eragrostis curvula*, has given higher yields than in any other rotation tested. (2) Peanuts have helped to control nematodes and are followed by tobacco yields second to those after lovegrass. (3) Cotton has controlled nematodes as adequately as peanuts or lovegrass, but cotton yields have not been sufficiently

dependable to make it a useful crop. (4) Allowing the land to revert for two years preceding tobacco has given exceptional quality, but yields were lower than after lovegrass and root-knot nematodes were almost as serious as in the third consecutive crop of tobacco. (5) Tobacco after one crop of velvet beans and then munga has produced good yields and was less affected by nematodes than continuous tobacco. A sunnhemp-munga-tobacco rotation produced average yields and nematode control about the same as velvet beans-munga. (6) Star grass resulted in very poor tobacco yields unless ploughed in early. (7) Maize has been followed by low tobacco yields and considerable nematode damage. (8) N applied on ploughing in star grass or munga increases the tobacco yield but is not advisable on sandy clay loam or clay loam. (9) On sand ploughing in star grass or munga in February, when green, increases the subsequent tobacco yield compared with ploughing in in April after reaping the seed, but late ploughing is recommended on sandy clay loam or clay loam. (10) Applying compost at 10 tons per acre before planting has increased tobacco yields. (11) Tobacco should not be grown more often than 1 year in 3.—Tobacco Res. Bd Rhod. Nyasaland.

1863. Endemann, W.
Zur Frage der Wasserversorgung der Tabakpflanze. **(On the water uptake of the tobacco plant.)**
Ber. Inst. Tabakforsch. Wohlsdorf-Biendorf, 1954, **1**: 30-44, bibl. 8.

The effects of watering and shading, chiefly of Havana 2c, on leaf morphology and quality were studied in 1952. The longest leaves were those of plants grown in shade tents, and they were of approximately equal length all up the stem giving the plants a columnar habit. The shortest leaves were produced on unwatered plants; the habit of plants grown in the open was pyramidal. Leaves in shaded and unwatered plots were broader than those in irrigated plots. Yields were not apparently affected by these morphological differences. Plants receiving water with a high Cl content showed reduced burning qualities, in spite of improved water uptake. Leaf from plants in the shade tent had the lowest surface weight and the finest leaf of the treatments. The burning qualities of shaded leaves and those of plants receiving rainwater were good. Water uptake had little effect on the elasticity of the leaf, although this tended to increase at higher levels of Cl supply. The present method of classifying tobacco is critically discussed.

1864. Endemann, W.
Zur Frage der Wasserversorgung der Tabakpflanze. Teil II. **(On the water uptake of the tobacco plant. Part II.)**
Ber. Inst. Tabakforsch. Dresden, 1955, **2**(1): 5-22, bibl. 10.

The experiments carried out in 1952 were repeated in 1953 and the earlier results were confirmed. There was a definite improvement in leaf elasticity in plants which had received chlorine in the water supply. The higher burning qualities of the tobacco receiving rainwater were not a direct result of the water supply, but were due to an indirect effect on fineness of leaf.

Composition.

(*See also* 1903m.)

1865. Tombesi, L.
Andamento di alcune attività enzimatiche e del contenuto in chetoacidi, N proteico, glucosio, amido e ac. citrico durante le fasi del ciclo vegetativo di *Nicotiana tabacum* var. Xanthi. **(Variations in the activity of certain enzymes and in the content of keto acids, protein N, glucose, starch and citric acid in *Nicotiana tabacum* var. Xanthi. during the growing cycle.)**
Tabacco, 1955, **59**: 344-9, bibl. 3.

Determinations were made at intervals of a few days from early youth to anthesis and seed formation. The chief conclusions were: (1) As in other varieties investigated, polyphenoloxidase and carbohydrase activity tends to increase during the growth cycle. (2) Unlike Virginia Bright, Xanthi has a high citric acid and a low glucose content. (3) The amount of citric acid per mg. of protein N is the highest yet observed in any variety. [See also *H.A.*, 26: 770, 771.]

1866. Giovannozzi-Sermanni, G.
Ricerche analitiche su *Nicotiana tabacum* con cromatografia su carta. **(Analytical studies on *Nicotiana tabacum* by paper chromatography.)** [English summaries 6, 11 and 9 lines.]
Tabacco, 1955, **59**: 327-43, bibls 5, 5 and 18, illus.

Studies were made on the sugars, the non-volatile organic acids and the aminoacids in 3 subtropical tobacco varieties before and after air-curing and after fermentation. The results and conclusions were: (1) Sucrose disappeared completely and glucose and fructose almost completely during curing. After fermentation glucose and fructose had completely disappeared from Sumatra and fructose from Round tip and Scafati 7. (2) The non-volatile organic acids found were oxalic, citric, malic, maleinic, succinic, fumaric, pyruvic and 3 unknown. (3) Sixteen aminoacids were found including one unknown. Citrulline appeared and arginine disappeared during curing. A relationship was found between methionine and cisteine, the appearance of either causing the disappearance of the other. [See also *H.A.*, 25: 736.]

1867. Fortini, S.
Respirazione, catalasi, catecolo ossidasi e contenuto in acido ascorbico in relazione all'età dei tessuti fogliari di alcune specie vegetali. Nota I. **(Respiration, catalase and catechol oxidase activity, and ascorbic acid content in relation to age of leaf tissues in certain plants. I.)** [English summary ½ p.]
Ann. Sper. agrar., 1956, **10**: 159-70, bibl. 6.

The plants investigated were *Nicotiana tabacum* and *Hedera helix*. The results were: (1) In tobacco leaves the hydrophilic character of the protoplasm colloids diminished with increasing age. (2) Catalase activity per unit fresh weight was consistently lower in young than in old tobacco leaves, but in ivy it was virtually independent of age of tissue and was directly proportional to the weight of the whole leaf. (3) In ivy respiration calculated for the whole leaf altered little

with age, but respiration per g. fresh matter fell rapidly with increasing age. (4) The ascorbic acid content of ivy leaves fell regularly with age in some cases and varied irregularly in others.—Staz. chim.-agrar. sper., Rome.

1868. MÜLLER, R.
Über die Tätigkeit der Saccharase im deutschen Tabak. (**Saccharase activity in German tobacco.**)
Ber. Inst. Tabakforsch. Wohlsdorf-Biendorf, 1954, **1**: 94-103, illus.

Saccharase activity in the tobacco plant varied with leaf position. Maximum activity was observed in leaves which were, biologically, the most mature. Variations in saccharase activity during drying and fermentation were also studied.

1869. MÜLLER, R.
Vergleich der Enzym-Tätigkeit der Saccharase und Amylase bei Inlandtabaken. (**Comparison of the enzyme activity of saccharase and amylase in German tobaccos.**)
Ber. Inst. Tabakforsch. Dresden, 1954, **1**: 278-91, bibl. 4, illus.

Some aspects of the enzyme processes during curing and fermentation were studied. Tobacco leaf material of various moisture contents was kept at 150° C. for 20 minutes. Amylase activity of leaves containing 5·5% moisture was maintained after the treatment, but in leaves with a higher water content (20·4%) there was total inactivation of amylase activity after the temperature treatment.

1870. MÜLLER, R.
Untersuchungen über die Tätigkeit des Fermentes Amylase im Tabakblatt. (**Studies on the activity of the enzyme amylase in tobacco leaf.**)
Ber. Inst. Tabakforsch. Dresden, 1955, **2**(1): 75-93, bibl. 6, illus.

The distribution of amylase activity within the tobacco plant was shown as a characteristic curve having a marked maximum and minimum. An activity curve of a relatively unripe plant showed a very narrow region of maximum activity, the interval between maximum and minimum activity being fairly wide. In a relatively ripe plant the characters of the activity curve were reversed. Amylase activity in topped and untopped plants was compared in the variety Havana 2c. The curve of activity of untopped plants dropped suddenly after the maximum, while in topped plants the fall was more gradual. Tobacco leaves infected with tobacco mosaic virus had an abnormally high amylase activity. Changes during flue-curing and fermentation have also been studied.

1871. PHILIPP, W.
Die Beziehungen zwischen der Glimmfähigkeit und den physikalischen Eigenschaften des Tabakblattes. (**The relationship between burning quality and the physical properties of tobacco leaves.**)
Ber. Inst. Tabakforsch. Dresden, 1954, **1**: 292-306, bibl. 8.

Several physical and chemical aspects of leaf quality were studied in tobacco of various origins. Burning capacity was related to the K_2O/CaO ratio and to the chlorine content of the leaf, while the speed of burning was related to the physical structure of the leaf. Burning capacity decreased with a decrease in the K_2O/CaO ratio, and with an increase in Cl content. The Cl content also affected hygroscopicity. [See also note 1903h.]

1872. ENDEMANN, W.
Untersuchungen über den Anteil der Trockensubstanz im wachsenden und reifenden Tabakblatt. (**Studies on the proportion of dry matter in growing and ripening tobacco leaf.**)
Ber. Inst. Tabakforsch. Wohlsdorf-Biendorf, 1954, **1**: 5-29, bibl. 6.

Two fairly clearly defined conditions have been observed to occur in tobacco leaves. During "disintegration" the surface weight of the leaf was reduced, and the weight of water per unit of area increased, so that the proportion of dry weight (as a percentage of fresh weight) declined. During "accumulation" opposite effects were observed, so that the proportion of dry weight increased. In mature plants disintegration was predominant in the lower leaves, at night, after rain and during seed formation. Accumulation predominated in the upper leaves, during the day (especially in the morning), in dry weather and when seed formation was inhibited by topping. Disintegration occurred earlier in Havana 2c than in other varieties tested. Water uptake and light affected these conditions. Disintegration was favoured by less satisfactory water supply and light deficiency; accumulation was favoured by adequate light and water conditions. These variations in conditions could also have an effect during drying and fermentation.

1873. WEIDEMANN, C.
Untersuchungen über den Einfluss des Bodens auf die Qualität des Tabaks. (**Studies on the effect of soil on tobacco quality.**)
Ber. Inst. Tabakforsch. Dresden, 1954, **1**: 167-78, bibl. 5.

Soil and leaf analyses were carried out in the tobacco-growing areas of eastern Germany. A relationship between leaf K_2O and soil CaO content was apparent. Plants growing in a clay soil contained 4·2% K_2O; those in a loamy sand contained 7·0% K_2O, although the soil content of K_2O was 11·7% lower than in the clay soil. At higher leaf contents of K_2O, the burning quality of the leaf was improved. Chlorine increased in the leaf proportionately to its increase in the soil.

1874. VICKERY, H. B.
The metabolism of the organic acids of tobacco leaves. IX. Effect of culture of excised leaves in solutions of oxalate and succinate in the presence of cyanide.
J. biol. Chem., 1955, **217**: 83-93, bibl. 30.

Leaves of tobacco (*Nicotiana tabacum* var. Connecticut shade-grown) cultured in darkness in 0·2 M solutions of potassium oxalate or potassium succinate at pH 6, to which potassium cyanide had been added in low concentration, took up the organic acid anions as

freely as leaves cultured in similar solutions which contained no cyanide. The respiratory loss, as measured by the disappearance of organic solids from the individual systems, was apparently slightly stimulated in the dresence of cyanide and, in general, respiratory loss was proportional to anion uptake. The bearing of these results upon the detection of a mechanism of anion uptake, in which a cytochrome-cytochrome oxidase system is involved in the manner postulated by Lundegärdh [see *H.A.*, 16: 1244], is discussed and it is shown that for technical reasons no conclusion can be drawn. The results of earlier culture experiments in which oxalate or succinate was furnished to tobacco leaves in culture solution are confirmed. [Author's summary.]—Conn. agric. Exp. Stat., New Haven. [See also *H.A.*, 25: 4085.]

1875. Ranjan, S., and Laloraya, M. M.
Amino-acid metabolism of *Nicotiana* leaves after removal from plant.
Nature, 1956, **177**: 235-6, bibl. 2.

An investigation of the amino-acid metabolism of detached tobacco leaves using the technique of horizontal migration paper chromatography is briefly described. A new range of amino-acids is formed possibly as a result of hydrolysis of insoluble leaf protein. A decrease with time in the amount of free amino-acids in leaves after removal from the plant suggests that these are probably being used up in respiration. The persistence of proline in the light and the appearance of a new band suggest that some light-reacting systems are also involved in the metabolism of plucked *Nicotiana* leaves.—Dep. Bot., Univ. Allahabad.

Curing.

(*See also* 1903e, l.)

1876. Endemann, W.
Die technische Reife des Tabakblattes. **(Technical maturity of tobacco leaves.)**
Ber. Inst. Tabakforsch. Dresden, 1954, **1**: 157-66, bibl. 12, illus.

Changes in leaf colour during the ripening processes are described, a distinction being made between the green-leaved and *aurea* forms. Colour changes during ripening proceed at different rates in the upper and lower leaves of a plant. In some varieties the lower leaves pass through the fully-ripe stage relatively quickly, and this is attributed to the overhanging habit of the upper leaves which reduces the light supply.

1877. Frankenburg, W. G., and Gottscho, A. M.
The chemistry of tobacco fermentation. I. Conversion of the alkaloids. B. The formation of oxynicotine.
J. Amer. chem. Soc., 1955, **77**: 5728-30, bibl. 14.

An appreciable amount of the nicotine which disappears during the fermentation of cigar filler tobacco appears in the fermented leaves as oxynicotine. It may be isolated as its dipicrate by means of a series of fractional solvent extractions. Oxynicotine can be determined analytically by reducing it to nicotine. [Authors' summary.]—Gen. Cigar Co., Inc., Lancaster Pa.

1878. Frankenburg, W. G., and others.
The chemistry of tobacco fermentation. I. Conversion of the alkaloids. C. The formation of 3-pyridyl propyl ketone, nicotinamide and N-methylnicotinamide.
J. Amer. chem. Soc., 1955, **77**: 5730-2, bibl. 7.

Additional nicotine degradation products formed during the fermentation of cigar filler tobacco are 3-pyridyl propyl ketone, nicotinamide and N-methylnicotinamide. An additional and major degradation product of nicotine was detected by paper chromatography, but was not identified. [Authors' summary.]—Gen. Cigar Co., Inc., Lancaster, Pa.

1879. Müller, O.
Praktische Erfahrungen mit einer neuen Heissluft-Trocknungskammer. **(Practical experience with a new hot-air curing chamber.)**
Ber. Inst. Tabakforsch. Dresden, 1954, **1**: 217-37, illus.

A curing chamber for green tobacco is described. Air, after passing over hot pipes, is carried to the ceiling and is then drawn downwards to a central exit channel by a fan. Temperature and humidity was satisfactorily controlled. A saving of 50% in fuel was obtained.

1880. Tobacco Research Board of Rhodesia and Nyasaland.
Equipment and method for flue-curing tobacco.
Inter. Rep. Tobacco Res. Bd Rhod. Nyasaland **5**, 1955, 1 folded sheet, bibl. 3, illus.

Plans and specifications are given for a furnace and flues and a ridge ventilator suitable for a 16 × 16 ft. barn. These are accompanied by brief notes on curing, drying and barn capacity.

1881. Endemann, W.
Über das Verhalten von Schattenzelttabaken während der Trocknung. **(The behaviour of shade-tent tobacco during curing.)**
Ber. Inst. Tabakforsch. Dresden, 1955, **2**(1): 23-9, bibl. 2.

Leaves from tobacco plants grown in shade dried more rapidly than did leaves from out-door plants. This was especially noticeable during the first few days.

1882. Philipp, W.
Gedanken und Vorschläge zur Einsparung von Arbeitsstunden bei der Tabaktrocknung. **(Ideas and proposals to save labour during tobacco curing.)**
Ber. Inst. Tabakforsch. Dresden, 1955, **2**(2): 77-95, bibl. 8, illus.

By mechanization of operations from threading the leaves to the fully cured stage, and by regulation of environment during curing.

Diseases and pests.

(*See also* 1646, 1661, 1699, 1848-1850, 1903c, i, j.)

1883. Berger, P.
Über klimatische und andere Bedingungen, welche die Ausbreitung einiger Tabakkrankheiten ermöglichen. (Climatic and other conditions which allow the spread of tobacco diseases.)
Ber. Inst. Tabakforsch. Dresden, 1955, **2**(2): 47-56, bibl. 24.

As affecting *Thielavia basicola*, *Alternaria tenuis*, *Pseudomonas* spp., *Sclerotinia sclerotiorum* and *Botrytis cinerea*.

1884. Humphries, E. C., and Kassanis, B.
Effects of darkness on the constitution of tobacco leaves and susceptibility to virus infection.
Ann. appl. Biol., 1955, **43**: 686-95, bibl. 10.

An attempt was made to find the causes of increased susceptibility to virus infection when tobacco plants are kept in the dark before inoculation. The changes in certain nitrogen fractions, viz. insoluble-N, amino-N, amide-N, ammonia-N and nitrate-N, and in dry matter and water content were followed in tobacco plants subjected to a period of darkness before inoculation with tomato aucuba mosaic virus. Only nitrate-N was strongly correlated with the susceptibility to infection, but the evidence suggests that the correlation is indirect and not causal. Dry matter and water contents, determined either as dry matter percentage of fresh weight or measured separately on a leaf-disk basis, were found to vary directly with variation in susceptibility. [Authors' summary.]—Rothamsted exp. Stat.

1885. Helms, K., and Pound, G. S.
Host nutrition in relation to concentration of potato virus X and tobacco ringspot virus.
Phytopathology, 1955, **45**: 567-73, bibl. 8, illus.

Nicotiana glutinosa, *N. tabacum*, and *Cucumis sativus* were grown in sand cultures watered with nutrient solutions containing different concentrations of N, of P, and of a balanced nutrient solution. Plants of the *Nicotiana* species were inoculated with potato virus X and the cucumber plants with tobacco ringspot virus. Of the 3 nutrient series used, N produced the most marked effects. Mild symptoms and low virus concentrations developed at the lowest level, and symptom severity and virus concentration increased with increasing concentrations. The maximum concentration, 1,050 p.p.m., caused stunting of the *Nicotiana* spp. and death of the cucumber plants. Low P levels were associated with mild symptoms and stunting of all hosts. There was little difference in host growth or symptoms at the higher levels. Concentration of both viruses generally increased with increased P. With balanced nutrient concentrations, maximum growth of plants of *N. tabacum* and of *N. glutinosa* infected with virus X was at 0·5H or 1H (the basal level). Maximum concentration of virus X was usually in plants grown at 1H. Maximum growth of cucumber was at 0·5H, and growth decreased with increasing nutrient concentration. The data suggested that variations in osmotic concentrations did not strongly affect multiplication of virus X or tobacco ringspot virus, except at the 3H level, which consistently caused reduction of virus concentration. [From authors' summary.]—Univ. Wisconsin, Madison.

1886. Helms, K., and Pound, G. S.
Zinc nutrition of *Nicotiana tabacum* L. in relation to multiplication of tobacco mosaic virus.
Virology, 1955, **1**: 408-23, bibl. 30, illus.

Multiplication of tobacco mosaic virus was studied in *Nicotiana tabacum* grown in water culture vessels containing a complete nutrient solution except for zinc, which was supplied at various concentrations. Development of virus symptoms was more pronounced in plants grown at zinc levels optimal for growth than in plants grown at zinc levels that were deficient. The concentration of virus nucleoprotein and of infective virus increased with increasing levels of zinc up to the level which was optimal for growth, and then decreased at levels which were toxic. Results suggested that virus multiplication was indirectly associated with utilization of zinc. The effect of indole-3-acetic acid on virus concentration, virus symptom expression and plant growth was studied. [From authors' summary.]—Univ. Wisconsin, Madison.

1887. Holmes, F. O.
Preventive and curative effects of thiouracil treatments in mosaic-hypersensitive tobacco.
Virology, 1955, **1**: 1-9, bibl. 15, illus.

Tobacco plants that were slightly resistant to local infection and highly resistant to systemic disease caused by tobacco mosaic virus became even more resistant in both respects as a result of 4- to 12-day treatments involving the application of 5 mg. of thiouracil as a soil drench to each plant daily. All plants used in this study carried the gene N that determines hypersensitivity. After heavy inoculation, many of them became stunted by top necrosis if they were not treated with thiouracil. Almost all could be protected against this by thiouracil treatments begun before, or immediately after, local lesions were observed. When given thiouracil soon after the appearance of local lesions they were, with rare exceptions, cured by 4-day and 10-day courses of treatment. Usually, although less consistently, they were protected against top necrosis by treatments of intermediate duration, such as 7-day applications. Plants given similar chemotherapeutic treatments after the development of systemic disease did not respond fully or consistently, but indications of partial improvement were observed in some cases. [Author's summary.]—Rockefeller Inst. med. Res., New York. [See also *H.A.*, 25: 722.]

1888. Allington, W. B., Weihing, J. L., and Laird, E. F., Jr.
Inhibition by high temperature of infection by tobacco mosaic virus.
Phytopathology, 1955, **45**: 595-6, bibl. 6.

Tobacco mosaic virus did not become established in tobacco leaves that were inoculated at 38–40° C. and then incubated at the same temperature for 6 hours or longer. No increase of virus occurred in such leaves during subsequent incubation at 15°. Comparable leaves inoculated at lower temperatures and then incubated at 38–40° became infected. Virus increase was inhibited in infected leaves during the heat treatment, but was resumed during subsequent incubation

at 15°. [Authors' summary.]—Neb. agric. Exp. Stat., Lincoln.

1889. Bartels, W.
Untersuchungen über die Inaktivierung des Tabakmosaikvirus durch Extrakte und Sekrete von höheren Pflanzen und einigen Mikroorganismen. Ein Beitrag zur Frage der Kompostierung tabakmosaikvirushaltigen Pflanzenmaterials. (**Research on the inactivation of tobacco mosaic virus by extracts and secretions of higher plants and some micro-organisms. A report on the problem of composting plant materials containing tobacco mosaic virus.**)
Phytopath. Z., 1955, **25**: 72-98, 113-52, bibl. 29, illus.

Experiments were carried out to discover the effect of culture filtrates of some bacteria and fungi, extracts of green leaves and yellowed foliage, root drainage water, and soil and compost extracts on tobacco mosaic virus (TMV). Four of the micro-organisms tested inactivated more than 90% of the TMV under the most favourable conditions. These were *Fusarium oxysporum*, *Trichothecium roseum*, *Thielavia basicola* and *Sclerotinia fructigena*. With smaller amounts of TMV the amounts of inhibitor required for inactivation were relatively greater. In general strong concentrations gave better inactivation of TMV than weaker concentrations. High alkalinity reduced micro-organism inactivation. The TMV molecule was still serologically active after a short period of contact with the micro-organism; increasing TMV inactivation resulted from an increased period of contact. In experiments with green leaves and yellowed foliage, extract or juice of more than $\frac{2}{3}$ of the species tested gave over 50% inactivation of TMV. Strong concentrations of extracts of currant and parsley leaves gave complete inactivation, and extracts of 13 other sorts of leaf gave more than 90% inactivation. In composting, 1 part of fresh TMV-containing material should be mixed with at least 1 part of dry foliage and 2 parts of water, or with 3 parts of green leaves. Inactivation was reduced at lower concentrations of the extracts. TMV inactivation was incomplete after a relatively short composting period (6 weeks). Alkalinity also reduced inactivation. TMV inactivation by certain strongly-acting extracts was to some extent reversible; serological reactions showed that the TMV molecule was not damaged. With water containing secretions drained from roots, those from linseed and peas grown in sand, and from wheat and rye in soil, were especially active (more than 90% inactivation) against TMV. Plants grown in glass wool showed less ability to form inhibitors. Alkalinity increased the activity of root drainage water. The inactivated TMV was still serologically active. Extracts of soil, compost and Indore compost did not completely inactivate TMV after short periods of contact.—Inst. Phytopath. PflSch., Univ. Rostock.

1890. Heggestad, H. E., Neas, M. O., and Grosso, J.
Comparison of various streptomycin dust and spray treatments for wildfire control in tobacco plant beds.
Plant Dis. Reptr, 1956, **40**: 48-51, bibl. 3, illus.

Five and 10 gal. of 200 p.p.m. streptomycin spray per 100 sq. yd. gave a wildfire (*Pseudomonas tabaci*) index of only 29–30 compared with 45–46 with 6 lb. of 1,000 p.p.m. or 3 lb. of 2,000 p.p.m. dust per 100 sq. yd., and 92 in the control.—Agric. Res. Serv. U.S. Dep. Agric., and Tenn. agric. Exp. Stat.

1891. Anon.
Control barn spot.
Rhod. Tobacco, 1955, No. 11, cover p. iii, illus.

A steam tube made of $\frac{3}{4}$ in. piping with $\frac{1}{8}$ in. holes 3 in. apart in a single line makes it possible to establish and maintain without furnace heat for the first 18–24 hours the conditions necessary for the control of barn spot (*Cercospora nicotianae*), namely 100% R.H. and 100–102° F. during colouring.

1892. Todd, F. A.
Experiments on tobacco blue mold control.
Tech. Bull. N.C. agric. Exp. Stat. **111**, 1955, pp. 17, bibl. 14, illus.

The results are given of 7 years' tests on ferbam, zineb, 8 other fungicides and 2 antibiotics for the control of blue mould (*Peronospora tabacina*). Zineb (2–100 spray and 6·5% dust) and ferbam (3–100 spray and 11·4% dust) were both effective. Zineb appeared to be slightly the more effective, but sometimes it caused very slight injury. Neither treatment affected the ability of the plants to survive transplanting shock. Tobacco plant growth was increased by both compounds, zineb being slightly the more effective. Manzate was the most effective fungicide tested and gave excellent control at $\frac{1}{2}$ lb. per 100 gal. water, but the margin of plant safety was small. The antibiotics were ineffective.

1893. Kuitert, L. C., and Tissot, A. N.
Control of insect pests of flue-cured tobacco.
A.R. Fla agric. Exp. Stats, 1954, pp. 91-2.

Sprays of TDE, DDT and endrin and a dust of TDE were applied during May and June. Satisfactory control was obtained of budworms and hornworms throughout the growing season. The 4 materials were equally effective against lepidopterous larvae, while endrin also controlled aphids and grasshoppers.

1894. Daulton, R. A. C.
Progress report on eelworm control experiments.
Rhod. Tobacco, 1955, No. 11, pp. 21-4, illus.

General notes are given on inoculation tests with *Meloidogyne javanica* on cereals, grasses, cover crops and other legumes and on rotational and cultural control experiments.—Tobacco Res. Bd Rhod. Nyasaland.

1895. Sasser, J. N., and Nusbaum, C. J.
Seasonal fluctuations and host specificity of root-knot nematode populations in two-year tobacco rotation plots.
Phytopathology, 1955, **45**: 540-5, bibl. 14, illus.

In the studies described: (1) The root-knot nematode populations fluctuated widely during the year. (2) The rotations tested all kept the populations down and thus made good tobacco crops possible. (3) A race of *Meloidogyne incognita* var. *acrita* was found which did not attack tobacco.—N.C. St. Coll., Raleigh.

1896. Lucas, G. B., Sasser, J. N., and Kelman, A.
The relationship of root-knot nematodes to Granville wilt resistance in tobacco.
Phytopathology, 1955, **45**: 537-40, bibl. 10, illus.

The relationship between infection by root-knot nematodes and severity of Granville wilt in a moderately wilt-resistant tobacco variety, Dixie Bright 101, was investigated in greenhouse experiments. Tobacco plants were grown in soil to which *Pseudomonas solanacearum* and *Meloidogyne incognita* var. *acrita* were added alone and in combination. Plants grown in soil infested with both pathogens exhibited wilt symptoms earlier and to a greater extent than plants grown in soil infested only with the wilt bacterium. The role of the nematodes appeared to be principally that of providing wounds through which the bacteria may enter. Among other points the rapid healing ability of the root tissues was demonstrated and the fact that bacteria enter mainly through fresh wounds. [From authors' summary.]—N.C. St. Coll., Raleigh. [See also *H.A.*, 26: 790.]

1897. Mountain, W. B.
Studies of nematodes in relation to brown root rot of tobacco in Ontario.
Canad. J. Bot., 1954, **32**: 737-59, bibl. 42, illus.

Two species of the root-lesion nematode, *Pratylenchus*, were shown to be the primary causal agents of brown root rot disease of tobacco in Ontario. Nine other parasitic and potentially dangerous nematode genera were also found associated with tobacco roots, but only in very low numbers. The effect of the preceding crop upon brown root rot was found to be related to nematode populations; for 8 such crops significant effects on subsequent tobacco growth occurred only in the presence of high populations of parasitic nematodes. For *P. minyus*, the more pathogenic species, the optimum soil temperature was at least 100° F., and little stunting was caused at a soil temperature below 70° F. Green Briar has been shown to be a resistant commercial variety of tobacco, and normal plant growth was maintained in it despite high populations of parasitic nematodes.

1898. Bünzli, G. H., and Büttiker, W. W.
Curculionid pests of tobacco in Southern Rhodesia.
Acta trop., 1955, **12**: 348-55, bibl. 2, illus.

Notes are given on the occurrence, habitat and control of *Mimaulus thesii*, one of the curculionids attacking young Virginia tobacco in Southern Rhodesia. Cultural control consists either of ploughing a year before planting and leaving the land fallow till planting or of late and thorough veld burning in November followed by ploughing for December planting, and of prompt and repeated hoeing of planted areas as soon as attack is observed. In chemical control experiments the application of 100 c.c. of 0·1% chlordane emulsion in the planting hole the day before planting or around each plant the day after planting gave very good control, namely, 94·6 and 90·5% stand respectively compared with 22·5% in the control.

1899. Dominick, C. B.
Further experiments with insecticides for control of green June beetle larvae.
J. econ. Ent., 1955, **48**: 621-2, bibl. 2.

Experiments were conducted in Virginia to control the third-instar green June beetle larvae (*Cotinus nitida*) in tobacco plant beds. Parathion was the most satisfactory insecticide for rapid and effective control. One properly-timed application of this material as a dust, a granulated formulation or a drench gave excellent control. Of the insecticides used, only lindane and chlordane caused any apparent injury to the young seedlings.—Va agric. Exp. Stat., Tobacco Res. Stat., Chatham.

1900. Oberthür, K.
Die Anwendungsmöglichkeit synthetischer Insektizide beim Tabak. 1. Mitteilung. **(The practicability of applying synthetic insecticides to tobacco. Part 1.)**
Ber. Inst. Tabakforsch. Wohlsdorf-Biendorf, 1954, **1**: 54-61, bibl. 16.

Fumigant preparations of BHC did not affect the aroma or taste of tobacco. Vulcasan O, which contains BHC, did not give satisfactory insecticidal action. A preparation containing only lindane (HX 52) gave good insecticidal control and no effect on taste or aroma of tobacco was apparent.

1901. Oberthür, K.
Die Anwendungsmöglichkeit synthetischer Insektizide beim Tabak. 2. Mitteilung. **(The practicability of applying synthetic insecticides to tobacco. Part 2.)**
Ber. Inst. Tabakforsch. Dresden, 1955, **2**(1): 51-63, bibl. 26.

The chief pests of tobacco and symptoms of the damage caused are described. The effect of several insecticides on taste, smell and burning qualities of tobacco varieties was studied and the results are tabulated.

1902. Whellan, J. A.
Hessian and stored tobacco pests.
Rhod. agric. J., 1955, **52**: 502-4.

Notes are given on the control of *Lasioderma serricorne* on hessian baling material by heat treatment in the drying barn or by carbon disulphide fumigation.

Noted.

1903.

a Anon.
Le marché des tabacs en Grèce. **(The tobacco market in Greece.)**
Rev. int. Tabacs, 1955, **30**: 219-21.
Including production by districts and varieties, and exports.

b Anon.
L'industrie du tabac à l'Ile Maurice. **(The tobacco industry in Mauritius.)**
Rev. int. Tabacs, 1956, **31**: 39.
Production and manufacture.

c COTTIER, W., AND GOURLAY, E. S.
New horticultural pest found on Nelson tobacco.
N.Z. J. Agric., 1955, **91**: 349-51, illus.
Life history of and injury by *Prodenia litura*.

d DEB, D. B.
The phenomenon of tri- and schizocotyly in *Nicotiana tabacum* Linn.
Sci. and Cult., 1955, **21**: 329-30, bibl. 15, illus.

e HOMANN, W. F., AND MÜLLER, W.
Über die chemisch-physikalischen Vorgänge im Tabak während seines Aufenthaltes in der Aufbereitungsmaschine. **(On the chemical-physical processes in tobacco while in the redrying machine.)**
Ber. Inst. Tabakforsch. Dresden, 1954, **1**: 238-48, bibl. 7.

f HOSKINS-DAVIES, R. G.
Rotations on the heavier tobacco soils.
Rhod. Tobacco, 1955, No. 11, pp. 29-30.
A grower's experiments and conclusions.

g LUND, H. A.
The biosynthesis of growth hormones in the pistils of flowers preliminary to the setting of fruit.
Diss. Abstr., 1955, **15**: 1485, being *Publ.* 12611 of 125 pp.
See H.A., 26: 63.

h PHILIPP, W.
Methoden zur Bestimmung der Glimmfähigkeit des Tabaks. **(Methods of determining the burning qualities of tobacco.)**
Ber. Inst. Tabakforsch. Wohlsdorf-Biendorf, 1954, **1**: 115-27, bibl. 12, illus.

i RABB, R. L., AND OTHERS.
Tobacco insects of North Carolina and their natural enemies.
Bull. N.C. agric. Exp. Stat. **394**, 1955, pp. 32, illus.
Of growing and stored tobacco.

j STEPHEN, R. C.
Barn rot—its cause and control.
Rhod. Tobacco, 1955, No. 11, pp. 5-6, illus.
Several organisms concerned.

k VAUGHAN, C.
Care of the tobacco crop.
J. Agric. Vict., 1955, **53**: 469-70, illus.

l WAGNER, V. J.
The 1955 tobacco leaf grading schools.
Qd agric. J., 1955, **81**: 125-33, illus.
Grading and packing leaf according to its position on the plant.

m ZELITCH, I.
The isolation and action of crystalline glyoxylic acid reductase from tobacco leaves.
J. biol. Chem., 1955, **216**: 553-75, bibl. 41.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Culinary and spice plants.

(*See also* 1954y, 2151.)

1904. VRZALOVÁ, J.
Vliv předseťové úpravy osiva kmínu na jeho rychlost klíčení. **(The effect of pretreating caraway seeds on speed of germination.)** [German and Russian summaries.]
Acta Univ. Agric. Silvic. Brno, 1955, **3**: 243-52, bibl. 29.

Germination of caraway seed, including old seed, was improved by soaking in water, results being improved by soaking at 20° C. By changing the water after 1 hour of soaking, or by soaking seeds in running water, the speed of germination of older seeds was further improved. Water extracts of caraway were found to have an inhibiting effect on germination and root growth of white mustard. The strongest inhibition was exercised by extracts with 10 c.c. water from 1 g. of seed. Inhibition by extracts obtained at 22° C. was greater than by those extracted at 7° C.

1905. KHAN, K. F., AND NATESAN, P. K.
A note on the influence of the size of seed rhizome on the yield in ginger (*Zingiber officinale*, Bosc.).
South Indian Hort., 1955, **3**: 77.

Two rates of seeding of ginger, namely 900 lb. and 1,350 lb. (each comprising 45,000 rhizomes) per acre, were compared in 3 cropping seasons. Higher yields and profits were obtained from planting the larger seed pieces.

Drug plants.

(*See also* 1954u, w, x.)

1906. CURTIS, R. G., HANDLEY, G. J., AND SOMERS, T. C.
Reserpine from *Alstonia constricta* F. Muell.
Chem. Ind. Lond., 1955, No. 49, pp. 1598-9, bibl. 2.

A brief account is given of a laboratory method of isolating reserpine from *Alstonia constricta*, a recently demonstrated source.—Nicholas Pty. Ltd, Melbourne.

1907. HOCHSTEIN, F. A.
Alkaloids of *Rauwolfia sellowii*.
J. Amer. chem. Soc., 1955, **77**: 5744-5, bibl. 5.

Alkaloids found in the root-bark were aricin, ajmalicine, reserpine, tetrahydroalstonine and at least 4 more which were not identified.—11 Bartlett St., Brooklyn, New York.

1908. EISENBERG, W. V., AND SCHULZE, A. E.
The differentiation of roots of *Rauwolfia serpentina* from roots of other *Rauwolfia* species. I. Microscopic methods.
J. Ass. off. agric. Chem. Wash., 1955, **38**: 857-65, bibl. 9, illus.

The absence of phloem sclerenchyma cells differentiated *R. serpentina* roots from those of 9 other species studied. —Dep. Health, Educ., Welfare, Washington, D.C.

1909. Banes, D., and Carol, J.
The differentiation of roots of *Rauwolfia serpentina* from roots of other *Rauwolfia* species. II. Chemical methods.
J. Ass. off. agric. Chem. Wash., 1955, **38**: 866-70, bibl. 6.
Spectrophotometric analysis of the aromatic acids obtained after hydrolyzing the weak alkaloids of *Rauwolfia* root has been employed for differentiating *Rauwolfia serpentina* from other species. The chemical procedure yields results which are consistent with those obtained by microscopic methods. [Authors' summary.] —Dep. Health, Educ., Welfare, Washington, D.C.

1910. Arthur, H. R.
δ-yohimbine from the bark of *Rauwolfia verticillata*.
Chem. Ind. Lond., 1956, No. 3, p. 85, bibl. 10.
δ-yohimbine was found to be present in the bark of *R. verticillata* which is endemic in Hong Kong and is to be the subject of an investigation.

1911. Correll, D. S., and others.
The search for plant precursors of cortisone.
Econ. Bot., 1955, **9**: 307-75, bibl. 60, illus.
In the United States Government schemes have been undertaken to collect and evaluate wild plants which might be a valuable source of cortisone. Collections have been made in Africa, Mexico, Central and South America, the West Indies and the United States. Emphasis was later placed on the species *Agave* and *Dioscorea*, which became of increasing importance. The treatment of the collected specimens, field tests and evaluations are described. The subterranean tubers of *Dioscorea* are regarded as the most useful source of cortisone precursors, and conclusions regarding its culture are given.

1912. Krider, M. M.
Steroidal sapogenins, precursors of cortisone.
Minn. Chem., 1955, **7**(2): 7, 8, 10, 13, 23, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **ARS-73-6**, Suppl. 1, No. 911.
A review article discussing the screening of plants for steroidal sapogenins and other constituents, and summarizing some results of this project.

1913. Fish, M. S., Johnson, N. M., and Horning, E. C.
Piptadenia alkaloids. Indole bases of *P. peregrina* (L.) Benth. and related species.
J. Amer. chem. Soc., 1955, **77**: 5892-5, bibl. 9.
Four indole bases have been found to occur in the seeds and pods of *P. peregrina* and *P. macrocarpa*. The pods contain N,N-dimethyltryptamine, and the seeds contain bufotenine, bufotenine oxide and N,N-dimethyltryptamine oxide. In addition, a 5-hydroxy-indole base of unknown structure was found in *P. macrocarpa* seeds. [From authors' summary.]—U.S. Dep. Health, Educ., Welfare, Bethesda, Md.

1914. Grundon, M. F.
Alkaloids from greenheart (*Ocotea rodioei*).
Chem. Ind. Lond., 1955, No. 53, p. 1772, bibl. 3.
Sepeerine and ocotine are the names proposed for 2 crystalline alkaloids obtained from the total alkaloids. —Univ. Glasgow.

1915. Warner, R. M.
Possible anti-cancer factor in figs.
Proc. 9th annu. Res. Conf. Calif. Fig Inst., 1955, pp. 22-5.
The small, faintly radioactive bodies contained in figs grown in the Mediterranean basin and California are believed by Dr. Bordas, a French scientist, to indicate the presence of a cancer-preventive factor.

1916. Džonova, M.
Poppy heads, after morphine extraction, for use as an organic manure. [Yugoslav, with German summary.]
Annuaire Fac. Agric. Sylvic., Skopje, 1953/54, 1955, **7**: 217-22, bibl. 5.
Compost from spent poppy heads compared favourably with farmyard manure and is considered to be particularly valuable for hot-bed culture.

Dye Plants.

1917. Pétard, P. H.
Les plantes tinctoriales polynésiennes. **(The Polynesian dye plants.)**
J. Agric. trop. Bot. appl., 1955, **2**: 193-9, bibl. 7.
Notes are given on the 10 chief dye plants of Polynesia. These include *Musa fehii*, *Ficus tinctoria*, *Aleurites triloba* and *Casuarina equisetifolia*.

Essential oils.

(*See also* 1954e, g, n, z.)

1918. Rao, A. S., and Muthana, M. S.
Preliminary studies on the essential oil from *Aristolochia indica*.
J. Indian Inst. Sci., Sects. A and B, 1955, **37**: 266-71, bibl. 7.
The essential oil from the roots of *Aristolochia indica* has been shown to consist chiefly of *d*-camphor, one new azulenic sesquiterpene and ledol. [Authors' summary.]

1919. Kesterson, J. W., and Hendrickson, R.
Essential oils from Florida citrus. Properties and commercial production methods.
Bull. Fla agric. Exp. Stats **521**, 1953, pp. 70, bibl. 40, illus.
Commercial methods of production of essential oils from Florida citrus have been studied and compared. Fruit variety, degree of maturity, seasonal variations and storage of fruit before extraction all affected the chemical and physical properties of expressed oil of orange.

1920. Adamanis, F., and Kaczmarek, T.
Technologia olejku kolendrowego. **(The technology of coriander oil.)**
Przem. Spoz., 1955, No. 1, pp. 12-16, from abstr. in *Polish tech. Abstr.*, 1955, **4**(20), No. 3854.
The oil of the Chaffy variety of coriander has organoleptic and physico-chemical properties conforming with pharmacopoeial requirements and was found to contain more d-linalool (67%) than the Soviet pharmacopoeial standard (40–60%).

1921. Ivanoff, D., and Ognianoff, I.
Bulgarian zdravets oil. II. Sesquiterpenic hydrocarbons from oil. [Russian summary 3 lines.]
C.R. Acad. bulg. Sci., 1955, **8**(2): 45-8, bibl. 4.
The isolation and identification of the hydrocarbons in the primary oil of *Geranium macrorrhizum*.

1922. Baird, J. V.
The influence of fertilizers on the production and quality of peppermint in Central Washington.
Diss. Abstr., 1955, **15**: 1691-2, being *Publ.* 14223 of 84 pp.
Studies were started in 1951 on the effect of soil fertility on yield and peppermint oil composition. A wider range of soil fertility level and a more uniform, dense and vigorous stand in 1953 resulted in greater extremes in yields and leaf and oil composition than in 1952. Nitrogen fertilization markedly increased hay and oil yields; P resulted in small yield increases; K and S had little effect on yield. Fertilization practices had no effect on the percentage oil content of sun-dried hay. In 1953 oil and hay yields were correlated positively with leaf N and negatively with leaf P. Plant parts high in N as a result of N fertilization were lower in P, slightly higher in K, and slightly lower in Ca contents than those low in N. Phosphorus, K and S fertilization had less effect on plant nutrient content than had N. Leaf N was much more important than leaf P in predicting yield. Menthol and menthofuran accounted for 76% of the variation in optical rotation of the oils in 1953. Menthol content of peppermint oil was inversely related to leaf total N in both years and directly related to leaf P in 1952. Leaf N was slightly more important than leaf P in predicting menthol content, and was approximately 3 times as important in predicting menthofuran content. There was a significant positive correlation between 1952 and 1953 menthol contents, and a significant negative correlation between 1953 menthofuran content and protein N in peppermint leaves.

1923. Watson, V. K., and St. John, J. L.
Relation of maturity and curing of peppermint hay to yield and composition of oil.
J. agric. Food Chem., 1955, **3**: 1033-8, bibl. 18.
The effect of plant development on the yield and composition of commercially produced eastern Washington peppermint oil was studied during 5 seasons. Maximum yields were obtained immediately after full bloom: it is not, however, considered advisable to select date of harvest on yield data alone. Optical rotation of the oil tended to decrease until about the date of maximum yield, and then to increase. Even with a delay in harvest until after September 1, however, the optical rotation may not increase to the minimum standard value of −18°. In 3 seasons there was a suggestion of a relationship between stage of development and yield, and a less definite relationship between stage of development and optical rotation. Total menthol and esters contents in the oil increased progressively throughout the season. Menthone decreased progressively from the earliest to the latest harvesting dates during 3 seasons. Length of curing after cutting had only a minor effect on composition; 2 days appeared to be about the optimum for this area. There was an indication that flower profusion depended to some extent on irrigation timing. Harvesting twice in a season was not satisfactory. Maturity was studied on samples collected from 3 sites in 1953. Variations in oil content were observed. These studies have shown a relationship between menthofuran content of the oil and its quality, and between extent of flowering and quality of oil. Practical methods of culture are needed, therefore, which will produce a maximum yield of higher quality oil.—Wash. agric. Exp. Stats., State Coll. of Wash., Pullman.

1924. Dimitrova, E., and Zolotovitch, G.
The effect of infestations of *Eriophyes menthae* on *Mentha piperita* and on its oil. [Russian, with English summary 6 lines.]
C.R. Acad. bulg. Sci., 1955, 7(3): 53-6, bibl. 3.
Plants of *Mentha piperita* attacked by *Eriophyes menthae* have clusters of damaged leaves and flowers instead of the normal composite flowers. Oil yields are reduced and quality is lowered. The content of menthone and menthofuran is increased.

1925. Ivanoff, D., and others.
Sur une méthode de dosage de l'huile essentielle des fleurs de la *Rosa damascena* Mill. en vue de sa sélection. **(A method of determining the essential oils of flowers of *Rosa damascena* for the purpose of selection.)** [Russian summary 3 lines.]
C.R. Acad. bulg. Sci., 1955, **8**(2): 57-60, bibl. 3.
By preserving freshly-cut flowers in a solution of 20% sodium chloride the oil content remains constant for 5 days. This makes it possible to accumulate a sufficient number of flowers for quantitative estimation of the oil content from single plants being tested for selection purposes.—Univ. Sofia.

Fibres.

(*See also* 1295, 1946, 1954q, 1955a.)

1926. de Klerk, J. C.
Vegetable fibres.
Sci. Bull. Dep. Agric. S. Afr. **342**, 1955, pp. 55, bibl. 20, 1s.
This bulletin contains (1) a classification according to their uses of the hard and soft fibre plants, totalling some 500, used in all parts of the world for all purposes; (2) an alphabetical list of their botanical names giving their commercial names, geographical source and uses; (3) an alphabetical list of their commercial names giving their botanical names; (4) a list of the fibres in the collection at the Glen Agricultural College Textile and Fibre Museum; and (5) brief notes on methods of extraction, retting and degumming.

1927. Bally, W., and Tobler, F.
Hard fibres.
Econ. Bot., 1955, **9**: 376-99, bibl. 42, illus.
An account is given of the botany, cultivation and extraction of fibres from leaves of agaves, Manila hemp, New Zealand flax and various bromeliads.

1928. Seale, C. C., Gangstad, E. O., and Joyner, J. F.
Agronomic studies of ramie in the Florida Everglades.
Bull. Fla agric. Exp. Stats **525**, 1953, pp. 30, bibl. 33, illus.

Six varieties of *Boehmeria nivea* and one *B. utilis* selection were compared in a variety trial. The variety grown commercially in Florida, P.1. 87521, gave significantly higher fibre yields than the other varieties. In a second variety trial P.1. 87521, introductions from Brazil and Japan and 7 Florida Everglades selections were compared. The Brazilian variety *B. nivea* P.1.205492 gave significantly higher yields than the others and also possessed the highest fibre content of the stalk. On newly-cultivated Everglades peat soil, which had been treated with Cu before planting, the most pronounced response was to Zn. N and P_2O_5 had no effect, but K_2O significantly increased yields of green plant material and fibre. On peat soils, which had been cultivated for 4 years and had received an annual application of about 30 lb. P_2O_5 and 150 lb. K_2O with minor elements, yields were significantly increased by application of 60 lb. of P_2O_5 per acre. No significant response to K_2O application was observed. Organic and inorganic sources of N had no significant effect on yields of green plant material or fibre.

1929. Allison, R. V., and Randolph, J. W.
Progress in the harvesting and processing of ramie and kenaf.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 190-201, illus.

A small field harvester-ribboner is being developed which will be of value to the small grower. As both processes are done in the field, cartage to a central ribboning plant is avoided, and the trash forms a valuable mulch for the crop. A small hand-ribboner has also been developed which recovers all the fibre and therefore is especially valuable for experimental work. Ramie and kenaf ribbons have been de-gummed in 3–5 minutes by a procedure in which full-length ribbons are passed between fluted rolls while immersed in a solution of caustic soda and detergent at 150–160° F. —Everglades Exp. Stat., Belle Glade.

Hops.

(*See also* 1954a, h, m, v, 2338.)

1930. Jary, C. L., and Beard, F. H.
New varieties: a summary of the present position.
Annu. Booklet Ass. Grs New Var. Hops, 1955, 1955, pp. 4–9.

The new English varieties are classified into 5 categories: (1) varieties in definite demand, namely, Northern Brewer, Pride of Kent and Bullion; (2) varieties with possible demand but no particular recommendation for growers; (3) good growers' varieties with limited or doubtful brewing demand; (4) wilt-tolerant varieties, namely, Keyworth's Midseason, Keyworth's Early Bramling Cross and Whitbread (1147); and (5) varieties definitely not recommended. The 1954 valuation, brewing demand, cropping capacity and general characteristics of each variety are given.

1931. Keller, K. R., and Likens, S. T.
Estimates of heritability in hops, *Humulus lupulus* L.
Agron. J., 1955, **47**: 518-21, bibl. 10.

Estimates of heritability of several characteristics were computed, using data from each of 3 replicated clonal propagule trials involving a number of selected experimental hop lines grown near Corvallis, Oregon. Total genetic variance, environmental variance, estimates of heritability on a single and replicated plot basis, and the expected gain from selection assuming the selection of the top 5% of the population were computed. The results indicated that there were highly significant differences among the lines. The average expected gains in per cent. of the mean when selecting the top 5% of the population on a replicated plot basis for yields, sidearm length and the percentages of total soft resin content and beta fraction indicated that an advance of 37, 40, 18 and 18, respectively, could be expected. The expected gain in per cent. of the mean for the percentage of alpha acid was 50·8, whereas estimates for leaf blade content of total P, K, Ca, organic N and nitrate N varied from 14 to 61%. Correlation coefficients computed between the various characters indicated that, in general, the factors were independent and therefore could not be utilized for predictive purposes. [From authors' summary.]—Oregon agric. Exp. Stat., Corvallis, and Agric. Res. Serv., U.S. Dep. Agric.

1932. Cripps, E. G.
Boron nutrition of the hop.
J. hort. Sci., 1956, **31**: 25-34, bibl. 17, illus.

The B content of hop leaves increases with maturity. Boron does not return from the bines to the rootstock on ripening. Symptoms of B deficiency in hops growing in sand cultures are described; this condition has been shown to be accentuated by high Ca treatment. A supply of 0·5 p.p.m. B in the nutrient solution was adequate for normal growth of hops in sand cultures. Symptoms of B toxicity in sand cultures, which are described, did not develop in hops receiving up to 2 p.p.m. B in the nutrient solution, but appeared in hops receiving 10 p.p.m. B. In a hop yard in Hereford soil applications of ½ oz. borax per hill controlled symptoms of B deficiency.—Hop Res. Dep., Wye Coll., Kent.

1933. Howard, G. A., and Tatchell, A. R.
New approach to the detailed analysis of hop resins.
J. Inst. Brew., 1956, **62**: 20-7, bibl. 14, illus.

Gas-liquid partition chromatography of the mixture of fatty acids obtained by oxidizing the α-soft resin of hops constitutes a rapid and accurate method for the determination of the cohumulone, humulone and adhumulone contents of the resin. The proportions of the corresponding colupulone, lupulone and adlupulone in the "β-acids" may be determined similarly or, alternatively, by the use of liquid-liquid partition chromatography. [Authors' summary.]—Brew. Indust. Res. Found., Nutfield, Surrey.

1934. Hall, R. D.
Evaluation of hops. III. Convenient method for polarimetric determination of the α-soft resin of hops.
J. Inst. Brew., 1956, **62**: 16-19, bibl. in text.

The polarimetric estimation of the total "humulones" in the α-soft resin of hops is improved both in its precision and convenience by treatment of the methanolic solution of the hop resins with a selected activated carbon. The removal of interfering substances, especially chlorophyll, in this way enables concentrated solutions to be examined, with the result that for a normal hop the observable rotation is sufficiently high to make reading errors negligible. Moreover, the stability of a methanolic extract of hops is considerably improved by such treatment with activated carbon. Preliminary observations on certain factors affecting the determination of the total soft resin content of hops are also included; in particular the result obtained is influenced by the temperature of grinding, though this does not affect the content of humulones. [Author's summary.]—Brew. Indust. Res. Found., Nutfield, Surrey.

1935. Gough, W. H.
Charcoal method for estimation of the content of humulones in hops.
J. Inst. Brew., 1956, **62**: 9-15, bibl. in text.

By the use of charcoal the colouring matters in ether-extracts of hops can be readily removed, leaving the resins unabsorbed; preliminary treatment of the charcoal with sulphur dioxide eliminates variations caused by adsorption of oxygen on the charcoal, and choice of type of charcoal is not critical. After transfer to pentane the content of humulones can be quickly and easily measured by polarimetry. The alternative procedures for estimating the β and other fractions can also be used. The method does not appear to be affected by the type of charcoal and is applicable to old as well as new hops. [Author's summary.]—Stag Brew., Pimlico, London, S.W.1.

1936. Bishop, L. R.
Comparative studies of methods of hop analysis. II. Estimation of humulone and other resin constituents.
J. Inst. Brew., 1955, **61**: 472-87, bibl. in text.

Collaborative studies organized by the Council of the European Brewery Convention have shown that any of the 4 established methods of analysis of the α-fraction can be used since, if precautions are taken to eliminate the errors to which they are liable, the results agree well. The methods in question are the Govaert and Verzele, the Wöllmer, the Ford and Tait, and the Walker and Hastings.—Stag Brewery, Pimlico, London, S.W.1. [For part I see *H.A.*, 26:842.]

1937. Verzele, M.
The lupulone and *iso*humulone complex.
Nature, 1956, **177**: 183, bibl. 3.

Chromatographic evidence is presented for the existence of a fourth lupulone in hops. The name prelupulone is proposed for it.—Lab. org. Chem., Univ. Ghent.

Insecticidal plants.

1938. Hoyos Bueno, M. J.
La *Muelleria frutescens* L. como especie insecticida. (***Muelleria frutescens* as an insecticidal plant.**) [English summary ½ p.]
Acta agron. Palmira, 1955, **5**: 169-85, bibl. 18, illus.

Muelleria frutescens contains rotenone and extracts of the fruit are lethal to insects and fish.

1939. Fontaine, T. D., and others.
Tomato leaves, a potential alkaloid and sterol source.
[*Publ.*] *U.S. Dep. Agric.* **ARS-73-8**, 1955, pp. not stated, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **ARS-73-6**, Suppl. 1, No. 904.

Tomatine is obtained from the leaves and stems of certain species of tomato plants. Its derivatives have certain antifungal, insecticidal and growth-stimulating properties. [See also *H.A.*, 25: 4055.]

Plant sources of antibiotics and antibiotics

(*See also* 1734, 1824, 1890, 1954i, 1975, 1980, 2028.)

1940. Mitchell, I. L. S., and Emery, W. B.
Antibiotics.
Reps. Progr. appl. Chem., 1954, **39**: 449-72, bibl. 228.

Including brief sections on the use of antibiotics for the control of plant diseases and on antibiotics derived from plants.

1941. Klemmer, H. W., Riker, A. J., and Allen, O. N.
Inhibition of crown gall by selected antibiotics.
Phytopathology, 1955, **45**: 618-25, bibl. 38, illus.

Eight antibiotics, namely terramycin, aureomycin, chloramphenicol, streptomycin, clavacin, polymyxin, penicillin and tyrothricin, were tested for their effects on (1) growth *in vitro* of the crown gall bacterium, (2) development of crown gall overgrowths in plants, and (3) growth and appearance of normal plant tissues. Tomato and marigold were used as test plants.—Univ. Wisconsin, Madison.

1942. Norman, A. G.
Terramycin and plant growth.
Agron. J., 1955, **47**: 585-7, bibl. 8.

The effect of terramycin on root growth and seedling development of some crop plants was examined, but no evidence of stimulation was observed. Elongation of primary roots of cucumbers was inhibited by terramycin at concentrations of 5–10 p.p.m.—Univ. Michigan, Ann Arbor.

1943. Crowdy, S. H., and others.
The translocation of antibiotics in higher plants. I. Isolation of griseofulvin and chloramphenicol from plant tissue.
J. exp. Bot., 1955, **6**: 371-83, bibl. 9.

The recovery and chemical identification of griseofulvin and chloramphenicol from broad bean plants grown in solutions of these antibiotics are described. Griseofulvin in the tissues was also estimated spectrophotometrically, and the weight supplied to the plant compared with that present in the plant tissues.—I.C.I. Ltd, Welwyn, Herts. [See also *H.A.*, 25: 1209.]

Seaweed.

(*See also* 1954b, c, l, p.)

1944. Valsan, A. P.
Alginic acid content of some of the common seaweeds of the Gulf of Mannar area.
Curr. Sci., 1955, **24**: 343-5, bibl. 3.

Sargassum spp. and *Turbinaria conoides*, the 2 most common brown seaweeds of the Gulf of Mannar area, gave yields of 17·55 and 15·96% alginic acid respectively. These yields are said to compare well with that of *Macrocystis pyrifera*, which is one of the chief commercial sources of alginic acid in the U.S.A.—Cent. Marine Fish. Res. Stat., Mandapam Camp.

1945. The National Research Council of Canada.
N.R.C. Review, 1955, 1956, pp. 55-8.

A report is given of work by the Maritime Regional Laboratory, N.S., on the biology, chemistry and drying of seaweeds.

Seed oils.

(*See also* 1954s, 2306h.)

1946. Popoff, A., and Ivanov, S.
Untersuchungen über das Ramiesamenol (*Boehmeria nivea* Hook. et Arnot.). (**Studies on seed-oil of ramie.**) [Russian summary 6 lines.]
C.R. Acad. bulg. Sci., 1955, **8**(2): 17-20, bibl. 6.

The oil was extracted with benzene at 60–70° C. Quantitative analyses showed that ramie seed oil could be classed between a typical semi-drying oil and a typical drying oil. It is characterized by its unusually large content of linolic acid in the absence of linolenic acid. The oil has a high free fatty acid content.—Chem. Inst., bulg. Acad. Sci., Sofia.

1947. Kumazawa, S., and Abe, S.
Studies on varieties of mustard. [Japanese, with English summary 2¾ pp.]
J. hort. Ass. Japan, 1955, **24**: 69-84, bibl. 14, illus.

Some 200 varieties of mustard (*Brassica juncea*) from Japan, China, Formosa and Nepal were investigated. The brown mustard extensively grown for oil and flour is considered to be the basic type. All the others can be classified into 4 broad types based on their characters and distribution. Notes are given on the principal characters and uses (often as vegetable or salad crops) of the 8 classes and 25 groups into which the varieties have been classified.

1948. Coppens, N.
Biosynthesis of fatty acids by seeds of *Ricinus communis*.
Nature, 1956, **177**: 279, bibl. 7.

Fractionation of castor oil from beans germinated in darkness revealed the presence of 5 fatty acids. Ricinoleic acid constituted 65–72% of the total.—Pharm. Inst. Lab. phys. Biochem., Univ. Ghent.

1949. Servant, M., Desmarest, J., and Poliakoff, J.
L'amélioration du karité au stade de la production paysanne. (**Improving peasant-produced shea butter.**)
Oléagineux, 1956, **11**: 89-93, illus.

Tests were made in Upper Volta on the effect on the acidity of shea butter of different methods of depulping, drying and storage. The conclusions were: (1) Depulping by hand and by fermentation are equally satisfactory. (2) Oven drying is better than sun drying. (3) It is better to store the nuts than the kernels. (4) Dryness and good ventilation are important in storage. Four types of oven are compared.

Sugar maple.

(*See also* 1954j, t.)

1950. Morrow, R. R.
Influence of tree crowns on maple sap production.
Bull. Cornell agric. Exp. Stat. **916**, 1955, pp. 30, bibl. 9, illus.

Investigations showed that (1) live crown ratio (ratio of height of crown to total tree height) and crown diameter are positively correlated with sugar percentage; (2) sap flow, of which measurement is difficult, appears to be correlated with the same 2 factors; (3) syrup production per bucket of sap increases proportionately with increases in average crown diameter, and is about the same per acre regardless of the size of the crown. It is concluded that the aim should be the development of single, large-crowned trees rather than a certain number of trees or production per acre.

Tannin plants.

(*See also* 1954k.)

1951. Wattle Research Institute, Pietermaritzburg.
Report of the Wattle Research Institute for 1954-55, pp. 37.

Information is given on the following current research. (1) *Thinning experiments* were concerned with suitable densities for various ages of plot. (2) *Planting experiments*: (i) In an experiment laid down in 1955 there were no significant differences between the survival rates of seedlings established by natural regeneration, line-sowing or strip-burning near stumps to stimulate the germination of natural seed, but all gave significantly better results than spot-sowing; line-sowing resulted in the best height of seedlings. (ii) In another experiment laid down in January 1955 line-sowing resulted in better survival than planting out seedlings raised in paper pots. (3) *Effect of time of first hoeing upon subsequent weed density and early seedling growth*: Seed was drill-sown shortly before felling the crop in November 1954. Hoeing during the winter prior to felling and again after the removal of the felled timber resulted in a 59% increase in mean seedling height at 8 months of age as compared with plots hoed only after the removal of the timber; this increase was achieved without any increase in labour costs. Hoeing immediately before felling had an equally beneficial effect upon seedling growth, but the total hoeing costs were 12½% higher. (4) *Genetics and plant breeding*: inbreeding, interspecific crossing, progeny trials and propagation by air-layering. (5) *Chemistry*: fertilizer experiments, soil investigations and bark studies. (6) *Entomology*: chemical and biological control studies. (7) *Weed control* of American bramble with 2,4,5-T.

Sundry plants.

(*See also* 1954d, f, 1955b.)

1952. Jones, J. L.
Taunton teasels *[Dipsacus fullonum]*.
Agriculture, Lond., 1956, **62**: 540-2.

Brief notes are given on culture and pest control in Somerset. About 50 growers are concerned on an acreage of from 250 to 300.

1953. Siddappa, G. S., and Bhatia, B. S.
Canning and candying palmyrah palm kernel.
South Indian Hort., 1955, **3**: 71-3, bibl. 2.
Tender kernels from *Borassus flabellifer* were shown to be suitable for canning in syrup. Hard, ripe kernels were not suitable for canning as they have only a mild flavour and do not soften satisfactorily; they are also unsatisfactory for candying as they do not absorb sufficient sugar. Little pectin was recovered from the kernel coats.—Centr. Food tech. Res. Inst., Mysore.

Noted.

1954.

a Anandaramiah, M. R.
Hops in Bangalore.
Lal-Baugh, 1956, **1**(1): 36-48, bibl. 7, illus.
Including brief notes on a small hop-growing experiment.

b Ando, Y.
Studies on essential oil of seaweeds. II. On the essential oil contents of various kinds of seaweeds. III. The constituents of the oil of *Dicytota dichotoma*. [Japanese, with English summaries.)
Bull. Jap. Soc. Sci. Fish., 1953, **19**(6): 713-16, 717-21, from abstrs in *Biol. Abstr., Sect. D*, 1956, **30**, Nos. 2755 and 2756.

c Black, W. A. P.
Seaweeds and their constituents in foods for man and animal.
Chem. Ind. Lond., 1955, No. 51, pp. 1640-5, bibl. 53.

d Carrera, C. J. M., and Cipolla, G.
Podredumbre de *Luffa cylindrica* L. producida por *Fusarium sambucinum* Fuck. **(A [fruit] rot of *Luffa cylindrica* caused by *Fusarium sambucinum*.)**
Idia, 1955, No. 95, pp. 13-15, bibl. 3, illus.

e Corbett, R. E., and Wong, L. C-K.
The volatile oil of *Dacrydium biforme*.
J. Sci. Food Agric., 1955, **6**: 739-43, bibl. 20.
Chemical analysis.

f Davis, W., and Ross, W. C. J.
The isolation of β-sitosterol from *Lithospermum officinale*.
Chem. Ind. Lond., 1955, No. 52, pp. 1739-40, bibl. 3.
In search of drugs against cancer tumours.

g Decary, R.
Quelques plantes aromatiques et à parfum de la flore de Madagascar. **(Some aromatic and perfume plants of the flora of Madagascar.)**
J. Agric. trop. Bot. appl., 1955, **2**: 416-22.

h Finn-Kelcey, P.
The applications of electricity to crop drying on farms. A critical review.
Tech. Rep. Brit. electr. Industr. Res. Ass. **W/T25**, 1955, pp. 31, bibl. 46, diagrams and charts, 24s.
Including short sections on hops and flower and vegetable seeds.

i Gerstner, W.
Antibiotische Substanzen von Samenpflanzen. **(Antibiotic substances from Spermatophytae.)**
NachrBl. dtsch. PflSchDienst, Berlin, 1956, **10**: 1-7, bibl. 73.

j Good, H. M., Murray, P. M., and Dale, H. M.
Studies on heartwood formation and staining in sugar maple, *Acer saccharum* Marsh.
Canad. J. Bot., 1955, **33**: 31-41, bibl. 19, illus.

k Grassmann, W., Stiefenhofer, G., and Endres, H.
Über Sumachtannin, einen neuen Typus der Tanningerbstoffe. **(On sumach tannin, a new type of tanning material.)**
Chem. Ber., 1956, **89**: 454-62, bibl. 23.
From *Rhus coriaria* and *R. typhina*.

l Hashimoto, Y., and Sato, T.
Animal protein factor (APF) and vitamin B_{12} in marine products. III. Seaweeds (Part 2) and others. [Japanese, with English summary.]
Bull. Jap. Soc. Sci. Fish., 1954, **19**(10): 987-90, from abstr. in *Biol. Abstr., Sect. D*, 1956, **30**, No. 2769.
Giving the B_{12} content of some 30 seaweed species.

m Howard, G. A., and Tatchell, A. R.
The structure of lupulone.
Chem. Ind. Lond., 1955, No. 49, p. 1595, bibl. 7.

n Ivanoff, D., and others.
Sur la distillation des alcools at du stéaroptène de l'huile de roses lors de l'hydrodistillation des fleurs de roses. **(Distillation of alcohols and of stearoptene of rose oil during the hydrodistillation of rose flowers.)**
[Russian summary 4 lines.]
C.R. Acad. bulg. Sci., 1955, **7**(3): 25-8, bibl. 6.

o Ivanoff, D., Stoïanova-Ivanova, B., and Ivanoff, T.
Sur la composition des hydrocarbures saturés de la cire des fleurs de roses bulgares. **(The composition of the saturated hydrocarbons of the wax of Bulgarian rose flowers.)**
[Russian summary 7 lines.]
C.R. Acad. bulg. Sci., 1955, **8**(2): 33-6, bibl. 7.
In *Rosa damascena*.

p KATAYAMA, T.
Chemical studies on volatile constituents of seaweed. II. On volatile acids of *Ulva pertusa* K. [Japanese, with English summary.]
Bull. Jap. Soc. Sci. Fish., 1953, **19**(7): 793-7, from abstr. in *Biol. Abstr., Sect. D*, 1956, **30**, No. 2774.

q KUNDU, B. C., AND RAO, N. S.
Origin and development of axillary buds in *Hibiscus cannabinus*.
Amer. J. Bot., 1955, **42**: 830-7, bibl. 20, illus.

r LENGELLÉ, M.
Present conditions and future outlook for French agriculture.
World Crops, 1956, **8**: 59-62, bibl. 5, illus.
Walnut oil and olive oil production are briefly mentioned.

s MEMBERS OF THE OIL AND COLOUR CHEMISTS' ASSOCIATION.
Resins, drying oils, varnishes and paints.
Reps Progr. appl. Chem., 1954, **39**: 618-39, bibls.
Brief mention is made of tung, castor, tobacco-seed and safflower-seed oils.

t NAGHSKI, J., AND WILLITS, C. O.
Maple sirup. IX. Microorganisms as a cause of premature stoppage of sap flow from maple tap holes.
Appl. Microbiol., 1955, **3**: 149-51, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **ARS-73-6,** Suppl. 1, No. 913.

u PILLAI, N. C., VAIDYANATHAN, C. S., AND GIRI, K. V.
A blood anticoagulant factor from the latex of *Carica papaya*. Part I. Purification and general properties.
Proc. Indian Acad. Sci., Sect. B, 1955, **42**: 316-24, bibl. 8.
The discovery of the factor was reported in 1952 (*Curr. Sci.*, 1952, **21**: 251-2).

v PREECE, I. A., AND MACLEOD, A. M.
Brewing, malting and allied processes.
Reps Progr. appl. Chem., 1954, **39**: 780-98, bibl. 139.
Including hop chemistry.

w SALMON, J.
L'utilisation populaire des plantes médicinales à Tahiti et dans les Iles de la Société. **(Common uses of the medicinal plants of Tahiti and the Society Islands.)**
J. Agric. trop. Bot. appl., 1955, **2**: 438-42.

x SCHÜLER, B. O. G., AND WARREN, F. L.
Reserpine from *Rauwolfia cumminsii* Stapf.
Chem. Ind. Lond., 1955, No. 49, p. 1593, bibl. 3.
A new source.

y SCHULTES, R. E.
El curioso rapé *yá-kee* del oriente de Colombia. **(The remarkable *yá-kee* snuff of eastern Colombia.)**
Agric. trop. Bogotá, 1955, **11**: 329-35, bibl. in text, illus.
A Spanish version of *H.A.*, 25: 1886.

z SHORT, G. R. A.
Essential oils.
Reps Progr. appl. Chem., 1954, **39**: 747-58, bibl. 103.

1955.

a SZENT-IVANY, J. J. H.
The cupmoth *Scopelodes dinawa* B. Bak. (family *Limacodidae*) as a pest of manila hemp and mango.
Papua N. Guinea agric. J., 1955, **9**: 124-8, bibl. 5, illus.

b VENTURA, M. M.
Solubilização dos constituintes nitrogenados da amêndoa de babaçú (*Orbignia Martiana* B. Rodr.). **(Solubility of the nitrogenous constituents of babassu kernel meal (*Orbignya martiana*).)**
Phyton, 1955, **5**: 107-14, bibl. 9.

FLORICULTURE.

General.

(*See also* 1374g, 1389, 1408, 1641, 1954h, 2053h, x, z, 2330, 2340e-g, k.)

1956. COE, F. W. (Chairman.)
The National Horticultural Magazine. Anniversary Issue, October 1955, Vol. **34**, pp. 187-295, illus.
Articles which have already been printed in the magazine were selected for inclusion in this anniversary issue. They include articles on *Roscoea* spp., Californian flowering shrubs, *Stewartia* spp., kalanchoës for the window garden, *Lewisia* spp., *Trillium* spp. and *Erythronium* spp.

1957. FOSSUM, M. T.
Commercial ornamental horticulture. Size of establishment and crop specialization of growers.
Market. Res. Rep. U.S.D.A. **96**, 1955, pp. 88, 50 cents.
Growers with large establishments (wholesale value of produce more than $25,000 p.a.) accounted for less than 50% of the production of citrus and other subtropical fruit trees, but more than 75% of the production of deciduous trees and shrubs, rose plants, deciduous fruit trees and grape-vines. On the smaller holdings nearly $\frac{3}{4}$ of the paid labour was part-time or seasonal; on larger holdings year-round employees accounted for $\frac{1}{2}$–$\frac{2}{3}$ of the paid labour. Costs of manures and fertilizers ranged from 1 to 5% of the wholesale value of the crops, and costs of insecticides and fungicides ranged from 1 to 2%. The costs of seeds, plants and bulbs for planting amounted to more than 11% of the wholesale value of crops produced on small holdings, but to only about 3·5% on large holdings. Advertising costs averaged nearly 4% of the total sales.

1958. FOSSUM, M. T.
Commercial floriculture. Size of establishment and crop specialization of growers.
Market. Res. Rep. U.S.D.A. **97**, 1955, pp. 75, 45 cents.

From the data assembled it is shown that for small growers retail trade was more important than wholesale trade, but that the relative volume of retail trade sales decreased with increases in the amounts of crop production. Smaller growers often used family, part-time or seasonal labour; in larger establishments ⅔–¾ of the labour was permanent. Costs of manures and fertilizers varied between 2 and 4% of the wholesale value of the crops, and plant protection materials cost about 1%; costs of seeds, plants and bulbs for planting varied from 5% of the wholesale values on large holdings to 11% on smaller holdings. Advertising costs averaged 1% of the total sales. Growers with large establishments accounted for less than 50% of the production of nursery plants and greenhouse chrysanthemums, and more than 90% of the production of greenhouse gardenias, orchids and roses.

1959. Mathias, M. E., and others.
Ornamental plants for low-elevation desert areas of Southern California.
Bull. Calif. agric. Exp. Stat. **750**, 1955, pp. 36, bibl. 8, map.

A brief discussion of the environmental conditions of this area is followed by 3 plant lists. List I includes plants observed by the authors to grow satisfactorily in the low-elevation desert, and these are graded according to frequency, condition and drought resistance; height, habit, leaf colour and frost tolerance are also noted. List II has been compiled from other reliable lists of plants for such areas in California and Arizona. List III is composed of plants suggested for trial and includes many recommended for other desert areas in the world.

1960. Maatsch, R.
Die Bedeutung der heimatlichen Standortsbedingungen. (**The importance of natural environmental conditions.**)
Gartenwelt, 1956, **56**: 1-3, bibl. 6, illus.

The extent to which growers should strive to imitate the conditions of the natural habitat of the plant is discussed [see also *H.A.*, 26: 974t]. *Cyclamen persicum*, which originated in the Middle East, is successfully grown without regard to soil or growth rhythm, provided it has approximately similar conditions of temperature and humidity. These two latter factors are also important in the culture of *Vriesea splendens*, a South American epiphyte. The main factors affecting growth are briefly discussed, and it is concluded that knowledge of natural environmental conditions is a valuable guide, but that these are not always optimal for growth.

1961. Duperrex, A.
Bacs de culture à irrigation souterraine pour les plantes d'appartement. (**Sub-irrigated troughs for house plants.**)
Rev. hort. suisse, 1955, **28**: 388-91, illus.

Concrete troughs, which have been waterproofed, are filled with a 5 cm. layer of gravel, and then a mixture of granular and fibrous peat. The plants grow in the peat and are fed by a nutrient solution which is maintained at a level of about 3 cm. in the gravel.

1962. Petersen, H.
Artificial light for seedlings and cuttings.
Bull. N.Y. St. Flower Grs, 1955, No. 122, pp. 2-3.

The author gives practical advice on the application of supplementary and additional light for use in intensive propagation from seed and cuttings.

1963. Yasuda, I.
Germination tests on some seeds of ornamentals.
Sci. Reps Fac. Agric. Okayama Univ., 1955, No. 7, pp. 31-5, bibl. 4, illus.

The germination rates of seeds of *Mimosa* sp. and *Acacia dealbata* previously soaked in 0·8% Uspulun solution for 20 minutes were very low, but became very high when the seedcoat was cut at the tip. Treatment with concentrated sulphuric acid or sodium hydroxide for ½ hour improved mimosa seed germination. The germination rate of local aster seed sown in the autumn was 70–80%.

1964. Lindemann, A.
Die Bewurzelungsfaktoren bei Stecklingen. (**Factors affecting the rooting of cuttings.**)
Dtsch. Baumsch., 1956, **8**: 12-16, bibl. 12, illus.

The several factors affecting rooting and their interactions are discussed [see also *H.A.*, 26: 70]. Synthetic rooting hormones are generally used in powder form; with "Wurzelfix" powder 70% rooting of *Sequoia gigantea* and 95% rooting of *Taxus baccata adpressa aurea* have been obtained. With soft wood cuttings hormone solutions have given good results, and after such treatment 1-year-old woody cuttings of *Hamamelis virginiana* rooted better than older cuttings. Weak concentrations of the sodium salt of 2,4-D (U 46) have also resulted in satisfactory rooting. Natural growth promoting substances in rooting media may also improve rooting. In peat from a North German high moor the humic acid content of the black peat from the lower layers was twice that of the "white" peat from the top layers, and rooting was better in a mixture of sand and black peat than in "white" peat. In certain woody cuttings high temperature promoted formation of lateral roots, whereas low temperature promoted increase in length of the main roots. The rooting of many herbaceous cuttings benefited from their being dipped in water before insertion.

1965. Lambert, H.
Un nouveau et merveilleux système de bouturage. (**A new method of propagation by cuttings.**)
Bull. hort. Liège, 1955, **10**: 383-4, illus.

The bases of softwood cuttings of some woody and herbaceous ornamental plants were immersed in a nutrient solution or in a substrate saturated with the nutrient solution. Little attention was needed, and roots appeared after 8–10 days. For cuttings taken in the summer, shading and watering were necessary. Vermiculite is recommended as the substrate.—École Hort. Liège.

1966. Bing, A., and McFaul, J. A.
Greenhouse tests with urea-formaldehyde nitrogen.
Bull. N.Y. St. Flower Grs, 1955, No. 122, pp. 3-4, illus.

Tests were made with Uramite (containing 38·5% N) as a slow-acting source of N for flower crops in greenhouses. When mixed with potting soil, a rate of

½ teaspoonful per 4-in. pot was best for the plants tested. For established hydrangeas in 7-in. pots a surface application of 2 teaspoonsful was most promising, but lower rates were safer for Croft lilies.

1967. Paech, K.
Colour development in flowers.
Annu. Rev. Plant Physiol., 1955, **6**: 273-98, bibl. 100.

This review discusses the carotenoid and flavonoid pigments recorded in flowers, the inheritance of flower colours, and colour tones and patterns.

1968. Smith, F. F.
Notes on the biology and control of *Pseudocneorhinus bifasciatus*.
J. econ. Ent., 1955, **48**: 628-9, bibl. 8.

Experiments on the control of the Japanese weevil on ornamental crops were carried out at Beltsville. The minimum concentrations that killed all weevils were 2·5% of aldrin, chlordane, heptachlor, isodrin, malathion and parathion and 1% of dieldrin. DDT, endrin, methoxychlor and toxaphene were non-toxic at the concentrations used. In 2 nurseries dusts containing 5% of heptachlor or 2·5% of aldrin killed adult weevils.—Ent. Res. Branch, agric. Res. Serv., U.S.D.A.

Annual and herbaceous plants.

(*See also* 1654, 1808, 2053c, g, q, 2054e, f, h, j.)

1969. Hayes, S. F., and Simpson, K.
Micaceous materials in pot plant production.
Gdnrs' Chron., 1955, **138**: 210-12, bibl. 2, illus.

Antirrhinum and salvia plants were potted in an experimental compost of ⅔ JIP and ⅓ mica and plant growth was compared with that in JIP. Experimental plants developed more rapidly than the controls, were healthier and showed more balanced growth. The final root weight was greater in the controls, but roots were fewer and thicker than those of the experimental plants. Flowering was earlier in the experimental plants.

1970. Hollings, M.
Physiological ring pattern in some Gesneraceae.
Plant Path., 1955, **4**: 123-8, bibl. 5, illus.

Ring and line patterns on leaves of genera of Gesneraceae (saintpaulias, gloxinias, etc.) were shown to result from sudden chilling in sunlight. Plants at an incident light intensity of 2,000 foot-candles were highly susceptible to chilling damage. At incident light below 30 foot-candles no markings could be induced. The minimum temperature for plant susceptibility was about 18° C. It is suggested that sudden chilling under conditions of high light intensity disorganizes some stage in the photosynthetic process within the leaf. By watering from below the danger of such injury can be avoided.—Plant Path. Lab., Harpenden, Herts.

1971. Domsch, K. H.
Beitrag zur Methodik der Keimfähigkeitsprüfung an Samen von Zierpflanzen unter Berücksichtigung samenübertragbarer Krankheiten. **(Report on a method of testing seed germination in ornamental plants with reference to seed-transmissible diseases.)**
Gartenbauwiss., 1955, **2**: 109-13, bibl. 18.

The germination of healthy seeds of *Callistephus chinensis* was compared with that of seeds infected with *Botrytis cinerea*. The seed was sown either in soil or in a Jacobsen germination apparatus. Four days after sowing healthy seeds had produced a similar percentage of healthy plants at temperatures of 12°, 16° and 20° C. Infected seeds, however, germinated more slowly at the lower temperatures and fewer healthy plants were produced than at higher temperatures. Removal of diseased plants during germination in the apparatus did not prevent spread of infection, but it was reduced by wide spacing. In the germination apparatus seedling resistance to pathogens was weakened. More reliable results were obtained from soil sowings than from those in the germination apparatus.—Biol. Bundesanst. Land-u. Forstwirts., Inst. Kiel-Kitzberg.

1972. Ober, D. E.
The genetics of variants of the William Sim carnation.
Diss. Abstr., 1955, **15**: 1298, being *Publ.* 12731 of 106 pp.

The extent of variability and degree of heritability was studied in William Sim and 4 of its mutant clones. No distinct differences in vegetative characteristics were found. Some streaking on red, white and flesh pink flowers was found. Background flushing of Weirich's Peppermint Sim, and Skyline's Frosted Sim varied with temperature, and light intensity and duration may also influence its occurrence. All the clones were diploids and bred as if they possessed the same colour genotypes. It is concluded that the mutants are periclinal chimaeras, with mutant tissue surrounding a core of non-mutant tissue.

1973. (Holley, W. D., and Caparas, J.)
Study soil content in carnation growth.
Flor. Exch., 1955, **125**(27): 9.

Pink Sim growing in a soil low in P(1–2 p.p.m.) produced as many flowers with the same average quality as in soils with high (8–16 p.p.m.) or very high (26–38 p.p.m.) P contents. A satisfactory level of P in the soil may be obtained by annual applications of 2½ lb. of treble superphosphate per 100 sq. ft. In moisture studies Red Sim was shown to be highly tolerant of wet soil provided the soil was of a loose structure.

1974. Lelliott, R. A., and Jenkins, J. E. E.
Slow wilt is attacking carnations.
Grower, 1956, **45**: 155-7, illus.

A bacterial vascular wilt of carnations has been isolated, and identified as *Erwinia* sp. It is probably spread mainly during propagation, and it is suggested that spread could be greatly reduced by breaking the cuttings at the node and putting them directly in the benches without standing them in water first. The propagating medium and benches should be steam sterilized between successive batches of cuttings. A careful watch for fresh outbreaks, especially among imported stocks, should be maintained.—Plant Path. Lab., Harpenden, Herts.

1975. Rhodes, A.
Tests with an antibiotic on carnations.
Grower, 1955, **44**: 1510-11, illus.

In tests on a commercial nursery, griseofulvin was applied to carnations either as a 1·5% foliage dust, as a 0·044% foliage spray or as a solution to the roots.

There was an indication of some control of diseases caused by *Alternaria dianthi* and *Fusarium culmorum*, but further confirmatory tests are needed. It was noticed that plants responded to griseofulvin treatment by earlier establishment of rooted cuttings, earlier breaks and a marked earliness in flowering. Increased vigour was also observed in chrysanthemum plants after control of mildew by griseofulvin.—Glaxo Labs, Stoke Poges, Bucks.

1976. Bestagno, G.
Osservazioni biologiche ed esperienze di lotta contro la *Cacoecia* (=*Tortrix*) *pronubana* Hüb. eseguite nell'anno 1954. (Notes on the biology of *Cacoecia pronubana* and on control experiments in 1954.) [English summary 6 lines.]
Riv. Ortoflorofruttic. ital., 1955, **39**: 439-48, bibl. 2, illus.

A number of chlorinated hydrocarbons, parathion, systox, pestox and lead arsenate were tested against the tortrix moth, *Cacoecia pronubana*, on several carnation varieties in 5 localities. Virtually complete control was obtained by spraying at 10-day intervals with 40% DDT plus 10% parathion at 0·4–0·5% from early June to the end of November or, if treatment began late, at 1% for a whole generation and then at 0·5% for the rest of the period. 20% parathion at 0·1% plus either a wetting agent at 0·02% or white oil at 0·1% also gave excellent control when applied every 6 days. None of the other insecticides gave such good results.—Osserv. Mal. Piante, Sanremo.

1977. Knappenberger, R. L., and Holley, W. D.
Tests with cut flower preservatives.
Bull. Colo. Flower Grs, 1955, No. 63, from abstr. in *Bull. N.Y. St. Flower Grs*, 1955, No. 121, p. 3.

Tests were made with various chemicals to prolong the life of White Sim carnation flowers. Calcium hypochlorite added to the water did not affect keeping quality, while Floralife gave erratic results. Ammonium or potassium alum (½ teaspoonful per gal.) increased cut flower life by 2–6 days. Sugar (2 teaspoonsful per gal.) added to the alum solution increased flower keeping for a further 2–4 days. Morelife doubled the lasting life.

1978. Kohl, H. C., Jr.
Water loss of potted chrysanthemums.
Bloom. News, 1955, **7**(5): 10, from abstr. in *Bull. N.Y. St. Flower Grs*, 1955, No. 121, p. 3.

Under Californian conditions potted chrysanthemum plants lost water at the rate of 1·1 oz. per plant per hour. Less than 0·5 oz. was lost when the plants were heavily shaded.

1979. Schwabe, W. W.
Factors controlling flowering in the chrysanthemum. V. De-vernalization in relation to high temperature and low light intensity treatments.
J. exp. Bot., 1955, **6**: 435-50, bibl. 16, illus.

Experiments are described which indicate that the annual vernalization requirement of the basal shoots of the chrysanthemum is due to annual de-vernalization of these shoots as the main axis grows up and flowers. Plants sprayed with varying concentrations of maleic hydrazide were arrested in their growth for considerable periods, but this enforced 'dormancy' did not affect their vernalization status. This makes it appear unlikely that mere suppression of growth through apical dominance of the main shoot is the cause of this de-vernalization of basal shoots. Fully or partly vernalized plants heated to 40° C. for up to 30 hours did not become de-vernalized. Heat treatment at 35° C. for as long as 30 days also failed to achieve complete de-vernalization, but here flowering was delayed by periods equivalent to the time spent at high temperature. However, at the end of the heat treatment progress towards flowering was resumed at the normal rate. Complete de-vernalization can be brought about by prolonged exposure to low intensity illumination. This treatment appears to be effective right up to the stage when the first morphological changes leading to inflorescence formation take place. These results are discussed in relation to similar experiments on the de-vernalization of rye and *Hyoscyamus niger*. [Author's summary.]—Imp. Coll. Sci., Technol., London.

1980. Robison, R. S.
Control of bacterial wilt of chrysanthemum with streptomycin.
Diss. Abstr., 1955, **15**: 1701, being *Publ.* 14055 of 172 pp.

Treatment of chrysanthemum cuttings with streptomycin through the rooting sand controlled an established infection of *Erwinia chrysanthemi*. With 50 p.p.m. there was almost complete survival of inoculated cuttings and no evidence of phytotoxicity. Disease control was also achieved by the addition of 1% by weight of streptomycin to a rooting hormone powder and by immersion of the cuttings for 10 minutes in a solution containing 50 p.p.m. of streptomycin before planting. Rooted cuttings were more resistant to infection than unrooted cuttings. Infection following root or stem inoculation was significantly reduced both by an initial application of 50 p.p.m. to the sand before rooting, and by the application of 10 p.p.m. a few days before transplanting. A strain of *E. chrysanthemi* was obtained which was resistant to streptomycin action. Varietal differences in tolerance to streptomycin were observed. Neither chelated Fe nor an inhibitor of chlorosis reduced the phytotoxicity of streptomycin under the test conditions.

1981. Miller, H. N.
Control of soil organisms causing damping-off and root rots of nursery plants.
A.R. Fla agric. Exp. Stats, 1954, p. 122.

In chrysanthemum soils effective control (90%) of soil diseases and weeds was obtained by methyl bromide (MC-2) fumigation. When cuttings were propagated under continuous mist at high light intensity, damping-off was reduced.

1982. Favard, P.
Une nouvelle maladie: l'acariose des chrysanthèmes. **(A new pest: chrysanthemum mite.)**
C.R. Acad. Agric. Fr., 1955, **41**: 572-3.

On the coast of Provence chrysanthemum plants have been severely attacked by the mite *Paraphytoptus*

chrysanthemi. The plants become stunted with yellow leaves. Suggested control treatment is spraying with sulphur, lime sulphur or parathion. Some indication of parasitism of the mite was found.

1983. Shifriss, O.
Genetics and origin of the bicolor gourds.
J. Hered., 1955, **46**: 213-22, bibl. 10, illus.
In monocoloured fruits of *Cucurbita pepo* the yellow pigment develops after anthesis, but in bicoloured gourds the yellow colour is visible in the early bud stages. The bicoloured races are usually genetically unstable and the mutation involved is reversible. The pattern is regarded as a case of variegation. It is suggested that the bicoloured ornamental gourds have evolved in cultivation during the past 150–300 years, and that the source of instability was a mutation in *C. texana*, a wild race of *C. pepo*.—Weizmann Inst. Sci., Rehovoth, Israel.

1984. Verona, O., and Loprieno, N.
Tumori radicali in *Gypsophila paniculata* L. **(Root galls in *Gypsophila paniculata*.)** [English summary 16 lines.]
Ann. Sper. agrar., 1956, **10**: 133-43, bibl. 8, illus.
Root galls caused by *Agrobacterium gypsophilae* in the collar region of *Gypsophila paniculata*, not previously recorded in Italy, were observed at Viareggio in 1950. The galls are particularly common in grafted plants and can extend right round the collar. They delay development and can cause death. There is no cure but disinfection of plants and soil is recommended.—Ist. Pat. veg. Univ. Pisa.

1985. Imamura, S.-I.
Flower initiation in Japanese morning glory, *Pharbitis nil* Chois. [Japanese, with English summary.]
Seiken Ziho, 1953, **6**: 97-100, from abstr. in *Biol. Abstr., Sect. D*, 1956, **30**, No. 2716.
Japanese morning glory [*P. hederacea*=*P. nil*] is one of the most sensitive short-day plants. Young decapitated plants, deprived of all leaves except a single newly-unfolded one, can be induced to initiate flower primordia on the developing axillary shoot by exposure to a single dark period lasting 16 hours. Light of very low intensity given to the plants immediately before the dark period, or light of short duration inserted in the middle of the dark period, diminishes the effectiveness of the dark treatment. The stimulus is received by the leaf and transmitted to the developing growing point through living tissue. The transmission occurs both in an acropetal and a basipetal direction at an average speed of 2·0–3·8 mm. per hour. It appears that some substance or substances are involved in the initiation of flower primordia.

1986. Drummond-Gonçalves, R.
Ferrugem branca em ipoméia. **(White rust on *Ipomoea*.)**
Biológico, 1955, **21**: 199-203, bibl. 7, illus.
A case is described of a severe attack of white rust (*Albugo ipomoeae panduranae*) on the ornamental *Ipomoea horsfalliae*. Control can be achieved by pruning and burning infected parts followed by spraying 2–3 times at 3-weekly intervals with a copper fungicide such as 1% bordeaux mixture.

1987. Morrissey, S.
Chloride ions in the secretion of the pitcher plant.
Nature, 1955, **176**: 1220-1, bibl. 3.
Chloride ions were found to be present in the juices of unopened and opened pitchers of 15 species of *Nepenthes*. An analogy is drawn between the proteolytic action in the pitcher and that in the mammalism stomach.—Bedford College.

1988. Köster, P.
Zur Untersuchung gärtnerischer Kulturerden. **(On the study of horticultural soils.)**
Gartenbauwiss., 1955, **2**: 92-108, bibl. 12.
Two types of potting compost were compared in pot experiments with *Primula obconica*, one being mixed with silt (I) and the other with manured soil (II). A salt concentration of 0·6% was considered to be the maximum for satisfactory growth. Nutrient levels considered necessary for the first few weeks after potting were 14 mg. N, 5–10 mg. P_2O_5 and 40 mg. K_2O per 100 g. soil. A fertilizer containing 125 mg. N, 190 mg. P_2O_5 and 250 mg. K_2O was applied as a top dressing, starting 4 weeks after potting. Plants receiving 1 or 2 doses of this fertilizer showed the best growth. Some chlorosis was observed among plants receiving 2 or 3 applications of fertilizer, and some plants also showed wilting after 2 or 3 applications, possibly owing to the high salt concentration in the compost. Plants in soil II made better growth than those in soil I.—Lab. Erdbereit., Hamburg-Blankensee.

1989. Schnack, B., and Fehleisen, S.
Nuevos datos sobre la variabilidad en la expresión del gen *rm* en *Matthiola incana* R.Br. **(New data on variations in the expression of the gene *rm* in *Matthiola incana*.)** [English summary 1 p.]
Rev. Fac. Agron. Eva Perón, 1955, **31**: 1-22, bibl. 3.
In experiments to determine the effects of temperature and heredity on the gene *rm* which normally produces unbranched plants, eversporting stock varieties were planted under glass and in the open at intervals between mid-April and late July. The results and conclusions were: (1) Higher temperatures increased branching, the difference in branching between doubles and singles being less in the later-planted plants. (2) The difference in behaviour between single and double plants is due to a pair of genes *L-l*, which govern the difference between the normal and the eversporting condition, reducing vigour in heterozygous plants (the singles in eversporting varieties) and causing them to branch less than doubles at higher temperatures.

1990. Schnack, B., and Fehleisen, S.
Un caso de dominancia parcial en *Matthiola incana* R.Br. **(A case of partial dominance in *Matthiola incana*.)**
Rev. Fac. Agron. Eva Perón, 1955, **31**: 93-6, bibl. 2.
Investigations on the genetic factors governing the anthocyanin pigmentation in stocks indicate that the difference in intensity between pale and very pale is due to a single pair of alleles, one of which is partially dominant over the other.

1991. Otto, A.
Lathyrus—Anbau in Hydrokultur. (**Sweet pea growing in water culture.**)
Gartenwelt, 1955, **55**: 388.
Sweet peas, for flowering from the end of February, were sown during the latter half of October in pots half-filled with gravel. The pots were plunged in benches of moist peat in a warm house and given nutrient solution once or twice a week. After germination they were planted out in water culture at 80 × 15 cm. and anemones were planted between the rows. The anemone corms had also been started in pots, 2 to 4 weeks earlier than the sweet peas. The varieties used were Zvolanek's Early Multiflora and Cuthbertson's Floribunda and Praecox sweet peas, and Coronaria de Caen anemones. Some yield and quality records are given.

1992. Godan, D.
Zur Bekämpfung der Veilchenblattrollmücke (*Dasyneura affinis* Kieff.). (**Control of the violet leaf midge.**)
NachrBl. dtsch. PflSchDienst., Braunschweig, 1955, **7**: 187-9, bibl. 5.
Sprays of a phosphoric acid ester and a systemic insecticide were tested against gall midges on violets. Larvae were killed at the most resistant stage by 2% concentrations of the insecticides, but these were phytotoxic. In general adults were controlled by DDT and the phosphoric acid ester at much lower concentrations. The ester preparation was the more effective, because at non-phytotoxic concentrations it also controlled the young larvae within the gall. Frequent and thorough spraying is necessary for control.—Inst. physiol. Zool., Berlin-Dahlem.

1993. Jones, W.
Foot rot of wallflower caused by *Phytophthora megasperma*.
Canad. J. Bot., 1955, **33**: 531-3, bibl. 4, illus.
A previously unreported foot rot disease of wallflower caused by the fungus *Phytophthora megasperma*, was found in British Columbia in 1953. The fungus proved to be pathogenic to wallflowers only under wet soil conditions, hence it is considered that good soil drainage is an important factor in the control of the disease. [From author's abstract.]—Plant Path. Lab., Saanichton, B.C.

Bulbs, tubers, etc.

(*See also* 1287, 1295, 1960, 2053b, l, o, s, u-w, 2054g, k.)

1994. Steffen, L.
Die Maschinenpflanzung gewinnt bei Tulpen an Boden. (**Mechanical planting of tulips.**)
Gartenwelt, 1956, **56**: 45-6, illus.
Brief descriptions are given of several bulb planting machines which have given satisfactory results. A five-row machine is in most demand; on heavier soils 2-row machines are too light for efficient planting. A semi-automatic planter will plant 7,500 sq. m. per day. A disadvantage is that the complete elimination of diseased bulbs is not possible.

1995. Abbiss, H. W.
Mechanised bulb lifting.
Comm. Gr, 1956, No. 3132, pp. 33-7, illus.
A bulb-lifting machine based on a self-propelled tool carrier has reduced labour by more than 60% under Cornish conditions. The top 2–3 inches of the soil surface layer are removed before the lifting share comes into action. The lifting head operates in an offset position so that pressure on the bulbs is avoided. Soil and bulbs are delivered to a cross-shaker, where the bulbs are riddled free, carried across the machine and dropped on to the soil surface where they may be left to dry.

1996. Spencer, J. L.
The effect of X radiation on the flowering of certain cultivated bulbs and corms.
Amer. J. Bot., 1955, **42**: 917-20, bibl. 9.
Bulbs and corms of 12 genera of cultivated monocotyledonous plants were subjected to X-ray treatment of 5,200r. As a result earlier anthesis was exhibited by *Crocus speciosum*, *Gladiolus* var. Filigree and var. Gene, *Hymenocallis calathina*, *Sternbergia lutea*, *Tritonia crocosmaeflora* and *Zephyranthes candida*. No significant differences in average dates of flowering occurred in the second year.—Fed. Exp. Stat., Mayagüez, Puerto Rico.

1997. Mossop, M. C.
Report of the Chief Entomologist [Rhodesia] for the year ending 30th September, 1954.
Rhod. agric. J., 1955, **52**: 517-32.
This report includes a note on exploratory trials made against aphids with a systemic insecticide, Isopestox, in the form of capsticks. A capstick was placed in the ground close to aphid-infested tulips, lilies and a young lemon tree about 18 in. high. In each case the aphids were killed but only after the lapse of a week or 10 days. The lemon tree became re-infested three weeks later.

1998. Gillard, A., and van den Brande, J.
Quelques problèmes concernant les nématodes des racines (*Meloidogyne* spp.) en Belgique, particulièrement la désinfection des tubercules de *Begonia multiflora* par traitement à l'eau chaude. (**Problems concerning root-knot nematodes in Belgium, particularly the hot water treatment of tubers of *Begonia multiflora*.**)
Parasitica, 1955, **11**: 74-80.
Begonia tubers infected with *Meloidogyne arenaria* were treated in hot water at temperatures between 41° and 52° C. for varying periods of 4 to 180 minutes. Nematode counts were made on the plants 10 months after treatment. The most satisfactory control was obtained by treatments for 60 minutes at 45° C. or 30 minutes at 48° C.; treatment at 41° C. for 1–2 hours stimulated development of tubers.—Landbouwhogeschool, Ghent.

1999. Werckmeister, P.
Cyclamenfarben und Cyclamenfarbstoffe. (**Cyclamen colours and pigments.**)
Saatgut-Wirtsch., 1955, **7**: 339-40, and 1956, **8**: 7-8, bibl. 19.
The several pigments in *Cyclamen persicum* may be divided into 3 groups, namely the cyclamin series, the Leuchtfeuer series and the neurosa series. Chromatographic studies have also shown the presence of 2 different aglucones, several glucosides and copigmentation.—Inst. Bot., Geisenheim am Rhein.

2000. Neiswander, R. B.
Control of insects results in more beautiful dahlias.
Ohio Fm Home Res., 1955, **40**: 80-1, illus.
Tests show that 4 oz. 25% malathion powder plus 3 oz. 50% DDT powder in 10 gal. water, applied every 10 days beginning when the plants are approximately 12 in. high, will give excellent control of the 5 most troublesome dahlia pests in Ohio, namely, potato leafhopper, tarnished plant bug, onion thrips, green peach aphid and the two-spotted spider mite (common red spider).

2001. Anon.
Essai de plantation échelonée de glaieul. **(Date of planting trials with gladiolus.)** Accélération de la végétation et de la floraison du glaieul par l'utilisation du froid et des abris vitrés. **(Advancing gladiolus growth and flowering by cold treatment and by growing under glass.)**
Rev. hort. Algér., 1955, **59**: 215-16 and 217-19.
Of a consignment of Jo Wagenaar gladiolus corms received at the Hamma Experimental Gardens, Algiers, in February 1954, one lot was planted immediately and the others were placed in cold storage and planted out at monthly intervals until February 1955. The results and conclusions were: (1) Flowering occurred in every month of the year except January and was poorest in December, February and March. (2) The growth cycle became shorter as the period of cold storage increased, being 210 days with no cold storage and only 140 after a year's cold storage. (3) Long cold storage resulted in smaller corms at the end of the growth cycle. (4) The period between planting and flowering was longer in winter but was little affected by length of cold storage. (5) The chief difficulties in all-the-year-round flower production are thrips in spring, summer heat and winter cold.
In another experiment at the Hamma Gardens with several varieties planted in mid-November, flowering was advanced (1) 15 days by growing the plants under glass until mid-April; (2) 18 days by giving the corms 1 month's cold storage at +4° C. before planting, and (3) one month by a combination of these treatments. Together or separately the treatments considerably reduced flowering. The variety Jo Wagenaar responded best to the treatments.

2002. Woltz, S. S.
Gladiolus fertility studies.
A.R. Fla agric. Exp. Stats, 1954, pp. 259-60.
Small autumn-planted corms benefited more from high N ratios in complete fertilizer applications than did larger corms, but rotting caused by *Fusarium* was increased by high N ratios. Increased K applications were more beneficial to spring-planted than to autumn-planted corms. Low levels of Ca in a nutrient solution resulted in symptoms similar to physiological bud rot, in breaking-over of flower spikes and in failure of flowers to open. High Mg levels aggravated Ca deficiency symptoms. Studies on the effects of N, P and Mg on Rosa Van Lima at varying levels of Ca showed that flower production was seriously decreased by high levels of the 3 elements at low Ca supply. Rosa Van Lima grown without B gave reduced flower yields; the yield reduction was accentuated by high K nutrition.—[See also *H.A.*, 26: 910.]

2003. Puccini, G.
Correlazione fra inibizione dello sviluppo fiorale e produzione dei cormi nei gladioli. **(Correlation between prevention of flower development and production of corms in gladiolus.)** [English summary 19 lines.]
Ann. Sper. agrar., 1956, **10**: 153-8, bibl. 2.
In experiments on 5 gladiolus varieties the inflorescence was removed at 4 different stages of development or left untouched throughout the flowering cycle. In general the greatest number and the greatest weight of corms and cormels were produced by plants from which the inflorescence had been removed either on first appearance or at anthesis of the first flower.—Staz. sper. Floric., Sanremo.

2004. Hattingen, R.
Schäden durch *Fusarium* an Gladiolen. **(*Fusarium* damage to gladioli.)**
Gartenwelt, 1956, **56**: 10-11, illus.
The disease was first noted in Germany in 1954. Symptoms on corms and foliage are described. The best control of the disease was obtained by treating the corms with Tritisan before planting; after this treatment only 22% of the young corms were diseased, compared with 100% in untreated controls.—Bayer. Landesanst., Veitschöchheim.

2005. Bruhn, C.
Untersuchungen über die *Fusarium*-Krankheit der Gladiolen (Erreger: *Fusarium oxysporum* Schl. f. *gladioli* (Massey) Snyder und Hansen). **(Research on *Fusarium* disease of gladiolus (causal agent *Fusarium oxysporum* f. *gladioli*).)**
Phytopath. Z., 1955, **25**: 1-38, bibl. 70, illus.
To control *Fusarium* occurrence on gladiolus, healthy corms should be selected for planting. A table is given detailing the appearance of healthy and diseased corms. All corms for planting should be sterilized, and several chemicals were tested. Good control, in 1 year's research, was obtained with wet and dry mercury compounds, formaldehyde and an iron carbamate. Gladiolus corms should not be replanted on the same soil until 4 years have elapsed. Varieties of gladiolus are not equally susceptible to *Fusarium* infection, but no completely resistant variety has yet been found.—Inst. Mykol., Berlin-Dahlem.

2006. Forsberg, J. L.
A summary of 1954 gladiolus disease control tests in Illinois.
Bull. Ill. St. Flor. Ass., 1955, No. 159, from abstr. in *Bull. N.Y. St. Flower Grs*, 1955, No. 121, p. 3.
Gladiolus scab control was best when Emmi at 1 pt. per 50 gal. water was used as a 15-min. soak immediately before planting corms. In addition, aldrin or heptachlor was applied in the furrow at 3 lb. of active ingredient per acre [see also *H.A.*, 25: 3112]. It is thought that the disease is spread by insects or nematodes.

2007. Royal Horticultural Society.
The lily year book, 1956, No. 19.
R.H.S., London, 1955, 9×5½ in., pp. 163, illus., 10s. + 9d. postage or U.S. $1.65 post free.

Much practical information on lily growing is contained in articles in this edition, together with reports on a group discussion on fritillaries and an "any question" meeting of the Lily Group. In a symposium 5 eminent horticulturists choose their 5 favourite lilies and state how they grow them. There are also 2 reports on the cultivation of *Lilium arboricola* by P. W. H. Conn and F. E. W. Hanger. In a supplement to Elwes' monograph, A. D. Cotton describes *Notholirion campanulatum*. Lily hybrids are also discussed.

2008. Royal Horticultural Society.
The daffodil and tulip year book, 1956, No. 21.
R.H.S., London, 1955, 9×5½ in., pp. 142, illus., 10s. + 9d. postage or U.S. $1.65 post free.

Among the many interesting articles included in this edition are those on "Daffodils in the grass" by F. Galsworthy, "Some small Narcissi" by F. R. Waley, and "Scent in daffodils" by A. Gray. There are also articles on the 1955 daffodil season, raising new daffodils, preparing daffodils for showing, and on the growing and showing of daffodils in Britain, Australia and New Zealand. J. S. L. Gilmour and R. W. Younger describe the National species collection of tulips at Cambridge.

2009. Silver, C. N.
Resultaten van proeven ter bestrijding van de grote narcisvlieg, *Lampetia equestris* F., in 1954. **(Results of tests to control the large narcissus fly in 1954.)** [English summary ¾ p.]
Jaarb. PlZiekt. Dienst, Wageningen, 1954/1955, pp. 194-9.

Complete control of larvae in the bulbs was obtained by fumigation with methyl bromide at 32, 28 or 24 c.c./cu.m. for 4 hours. Vacuum treatment for 2 hours with methyl bromide was not satisfactory. Bulb fumigation with HCN at rates from 6–18 g./cu.m. for 24 hours gave complete control. Vacuum treatments with HCN for 2 hours also gave good results. Bulbs of the varieties Flower Record and Poetaz were damaged at the higher HCN rates. Field dusting of the bulbs gave unsatisfactory fly control. Dipping the bulbs before planting in aldrin, dieldrin, chlordane or heptachlor largely prevented infestation in the field.

2010. La Cour, L. F., Deeley, E. M., and Chayen, J.
Variations in the amount of Feulgen stain in nuclei of plants grown at different temperatures.
Nature, 1956, **177**: 272-3, bibl. 8.

The results are given of experiments in which Feulgen staining in the nuclei of *Scilla* spp. and other plants was measured photometrically by means of a scanning densitometer. Alternative interpretations are suggested, namely, either that the decrease in the amount of Feulgen stain in the nuclei of roots grown at low temperature represented a true reduction of the deoxyribonucleic acid content or that the change in temperature might alter the reactivity of the deoxyribonucleic acid to the Feulgen stain.—John Innes hort. Instn, Bayfordbury, and Wheatstone Phys. Lab., King's Coll., London.

2011. Toyoda, T., and Nishii, K.
Studies on forcing tulips for export. III. Effect on previously cold-stored bulbs of duration of and temperature during shipment. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1955, **24**: 122-30, bibl. 8, illus.

In an experiment to determine the effect on the subsequent growth and flowering of 3 tulip varieties of storage at room temperature for periods of 0–60 days between cold treatment and planting, bulbs stored for 15–30 days' gave the best results. In a second experiment bulbs previously cold-stored were kept at 10–25° C. for a month before planting. The higher temperatures delayed flowering compared with 10° C. It was concluded that bulbs cold-stored until September and then exposed to 10–15° C. for a month during shipment could easily be forced into flower in late December and January if planted on arrival and forced in a greenhouse from early November. [For Part II see *H.A.*, 25: 1934.]

2012. Markgraf, F.
Wie hält die erwachsene Tulpenzwiebel ihre normale Bodentiefe? **(How does the developing tulip bulb maintain its normal depth in the soil?)**
Gartenbauwiss., 1955, **2**: 195-6, bibl. 4, illus.

In tulip bulbs planted on the soil surface a single foliage leaf and a "boring body" of about 6 cm. were developed. A longitudinal section showed a new bulblet at the tip of the borer. This daughter bulb had been formed normally in the axil of the basal foliage leaf, and its axis, together with the base of the subtending leaf, had developed downwards into the soil.—Bot. Garten, München.

2013. Kraus, G., and Hauszer, K. T.
"Kindelbildung" bei Tulpen. **(Abnormal vegetative growth in tulips.)** [German, English, French and Spanish summaries 2 lines each.]
Mitt. Klosterneuburg, Ser. B, 1955, **5**: 282-5, illus.

In *Tulipa kaufmanniana* the vegetative growing point may sometimes grow downwards. The phenomenon is attributed to the effect of wide ranges of temperature and rainfall during January and February.

2014. von Oppenfeld, H., and others.
Cold storage of field-grown cut tulips.
Quart. Bull. Mich. agric. Exp. Stat., 1955, **38**: 273-8.

Field-grown cut tulip flowers kept satisfactorily in dry storage at 32° F. in film-overwrapped, bulk and consumer-size boxes for a period of 30 days. Bulk storage in corrugated paper boxes, overwrapped and sealed with polyethylene, was less satisfactory than storage in closed drums during a 2-week test period. Water losses and damage by oxygen depletion or CO_2 accumulation limited storage life.

Lawns.

(*See also* 1644.)

2015. Alberta Horticultural Advisory Committee.
Lawn building and maintenance.
[*Publ.*] *Alberta hort. adv. Cttee*, 1955, 1 folding sheet.
Advisory notes are given on seeds mixtures suitable for Alberta, soil preparation, sowing, maintenance and the control of weeds and snow mould.

2016. Drake, F. R.
Lawns and playing fields.
J. Agric. Vict., 1955, **53**: 529-38, illus.
The author deals with the main causes of failure ot establish a satisfactory lawn and the measures necessary to overcome these difficulties.

2017. Juska, F. V., Tyson, J., and Harrison, C. M.
The competitive relationship of Merion bluegrass as influenced by various mixtures, cutting heights, and levels of nitrogen.
Agron. J., 1955, **47**: 513-18, bibl. 10, illus.
Pot studies were made in a greenhouse to determine the competitive behaviour of Merion, a new strain of Kentucky bluegrass (*Poa pratensis*) as influenced by various mixtures containing red fescue (*Festuca rubra* var. *genuina*), redtop (*Agrostis alba*) and domestic ryegrasses (*Lolium multiflorum* and *L. perenne*), when subjected to 2 levels of N, to cutting at $\frac{3}{4}$ in. and 2 in. and to no cutting with medium fertility. The results were: (1) The greatest yield of clippings was produced by cultures supplied with high N and cut at 2 in. (2) High N and low cutting treatments inhibited root and rhizome production to the greatest extent. (3) Redtop had the most depressing effect on the production of Merion bluegrass top growth, followed by domestic ryegrass. (4) Merion bluegrass competed favourably with redtop when not more than 10% redtop was used in the mixture and a high level of N was maintained. (5) Merion bluegrass competed favourably with ryegrass in 50% mixtures, especially under high cutting and high N treatments. (6) In mixture with creeping red fescue Merion bluegrass predominated under high N conditions, while creeping red fescue predominated under low. (7) The best turf was produced when Merion bluegrass was seeded alone and maintained under a high level of N.—Mich. agric. Exp. Stat., E. Lansing.

2018. Christie, J. R., Good, J. M., Jr., and Nutter, G. C.
Nematodes associated with injury to turf.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 167-9, bibl. 3.
In turf samples collected in Florida the most commonly occurring nematodes were the sting nematode (*Belonolaimus gracilis*), the crown-headed lance nematode (*Hoplolaimus coronatus*) and a spiral nematode (*Rotylenchus* sp.).

2019. Overman, A. J.
Use of nematocides on established turf.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 170-3, bibl. 1.
Two nematocides, VC 1–13 and Nemakril, were compared on a golf course fairway. The materials were injected or drenched, at rates of 15 and 30 gal. per acre. Both rates of Nemakril, drenched or injected, had drastically reduced nematode populations 8 weeks after treatment. VC 1–13 was efficient when injected, but in drenched plots it reduced populations only when plant density was not too high. No phytotoxicity was apparent.—Gulf Coast Exp. Stat., Bradenton.

2020. Ritty, P. M.
A preliminary report on nematode control in a turf maintenance program.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 174-6.
Nemakril was applied at 4-monthly intervals to a nematode-infested bowling green. The material was not phytotoxic to the established Bermuda grass, and nematode populations were depressed.

Orchids.

2021. Mott, R. C.
Lack of water a cause of cattleya leaf "die-back".
Bull. N.Y. St. Flower Grs, 1955, No. 120, p. 1, illus.
Incidence of leaf tip burn on current year's growth of cattleya plants, due to continuous high temperatures and high light intensity in summer, was found to depend on frequency of watering and fertilizer application (with a 20–20–20 fertilizer solution). Non-fertilized plants did not show injury, regardless of watering treatment. Of the fertilized plants, some developed tip burn with every watering treatment except daily surface watering.—Cornell Univ.

Succulents.

(*See also* 2053e, 2054h.)

2022. Sieber, J.
Untersuchungen über die Wasser- und Nährstoffaufnahme bei epiphytischen trichterbildenden Bromeliaceen. (**Studies on the water and nutrient uptake of epiphytic funnel-forming bromeliads.**)
Gartenbauwiss., 1955, **2**: 141-64, bibl. 21, illus.
Water and nutrient uptake was studied in *Aechmea fasciata*, *Nidularium innocentii*, *Guzmannia tricolor*, and *Vriesia splendens* at all stages from germination to mature, flowering plants. Absorption through roots or leaves was equally effective, and occurred in plants from the youngest stages onwards. In an absorptive, humus substrate root nutrition produced better growth than leaf nutrition; in a less absorptive medium leaf nutrition gave better results. Combined leaf and root nutrition was particularly effective, except in young plants. At the youngest stages root nutrition was more important than leaf nutrition, but the position was reversed with increasing age. Root growth was stimulated more by root nutrition than by leaf nutrition. Growth of unpotted plants receiving leaf nutrients was increased by high relative humidities. Plants of *Aechmea fasciata* fed through the leaves developed loose, pendulous growth with long leaves, and a relatively long inflorescence. With root nutrition, growth was more compact, with broader, upright

leaves of a clear green; the inflorescence was relatively short. In *Nidularium innocentii* nitrogen was most readily absorbed through the leaves, and P_2O_5 and K_2O through the roots. Nutrient solutions were absorbed more quickly than water by *Aechmea fasciata*. —Bot. Inst., Techn. Hochsch., München in Weihenstephan.

2023. Wasscher, J.
Een periklinale chimaere bij *Kalanchoë*. (**A periclinal chimaera of *Kalanchoë*.**) [English summary 6 lines.]
Euphytica, 1955, **4**: 254.

The Ernst Thiede variety of *Kalanchoë blossfeldiana* has produced a budsport with more compact growth and more intense flower colour. The new variety has been called Hameland; it can only be propagated vegetatively.

2024. Schwabe, W. W.
Evidence for a flowering inhibitor produced in long days in *Kalanchoë blossfeldiana*.
Ann. Bot. Lond., 1956, **20**: 1-14, bibl. 15.

Experiments with *Kalanchoë blossfeldiana* have shown that: Single long days intercalated between numbers of short days have a positive inhibitory effect on flower initiation. The inhibitory effect expressed as the number of inductive cycles annulled is approximately additive, provided the long days are interspersed with short days, but not if several long days are given consecutively. On the average 1 long day is capable of annulling the flower-promoting effect of about 1½–2 short days. To a first approximation flower numbers in *Kalanchoë* increase exponentially with the number of inductive cycles given—up to at least 12 short days; the inhibitory effect of long days interspersed with short days also fits an exponential curve; i.e. the inhibition is roughly proportional to the amount of previous photoperiodic induction. A light break of as little as 30 seconds' duration given in the middle of a long dark period is as inhibitory as a long day. If followed by a long dark period the inhibition of an intercalated long day is almost completely neutralized; a long dark period preceding it has no such effect. These results have been interpreted as being due to the interaction of a flowering inhibitor with a reaction leading to flowering. A mechanism involving competitive inhibition of an adaptively formed enzyme has been described as a possible example of the kind of reaction which could account for the results presented.—[From author's abstract.]—Res. Inst. Plant Physiol., Imp. Coll. Sci. Tech., London.

Roses.

(*See also* 1655, 1695, 1925, 1954n, o.)

2025. Lundstad, A.
Forsøk med sorter av klaseroser. I. (**Variety trials of cluster roses. I.**) [English summary ½ p.]
Forskn. Landbruk., 1955, **6**: 337-57, bibl. 8.

Trials with 61 polyantha, polyantha hybrid and floribunda varieties were started at Vollebekk in 1952. Observations on growth and flowering are recorded, and twelve varieties have been selected as desirable.

2026. Anon.
New aerosol for rose growers.
Agric. Newsl., 1955, **23**: 117.

The Du Pont company have produced an aerosol which delivers an insecticidal spray and a fungicidal dust at the same time. The mixture includes methoxychlor, lindane and rotenone which control the major insect pests. Mildew and black spot are controlled by a mixture of zineb and dinitro(1-methylheptyl) phenyl crotonate.

2027. Jacks, H., Webb, A. J., and Hunter, J. A.
Black spot of roses. Modern methods of control.
N.Z. Gdnr, 1955, **12**: 259-61.

During the period 1951-55 several fungicides were tested on 3 rose varieties for control of black spot (*Diplocarpon rosae*). No material gave complete control. Appreciable reduction of infection was given by the following sprays: 0·16% colloidal sulphur, 0·13% zineb, 0·1% captan, 0·14% ziram, 0·1% thiram, and 0·004% of phenyl mercury chloride.

2028. Swartwout, H. G.
Preliminary trials with Acti-dione against powdery mildew on roses, cedar rust on apples, and downy mildew on grapes.
Plant Dis. Reptr, Suppl. **234**, 1955, pp. 131-2.

The results of tests in 1954 and 1955 were: (1) 0·5 p.p.m. Acti-dione plus 8 oz. Triton B1956 spreader per 100 gal. water controlled powdery mildew (*Sphaerotheca* sp.) and caused very little injury to the sensitive greenhouse rose variety Pink Bountiful. (2) Two applications of 0·5 p.p.m. Acti-dione plus 2 or 8 oz. Triton per 100 gal. water almost completely controlled mildew on Dorothy Perkins roses in field tests. (3) Two applications of 1·0 p.p.m. Acti-dione plus 1 oz. Triton stopped the development of cedar rust (*Gymnosporangium* sp.) lesions on apple leaves when treatment began as soon as the rust spots were visible, but caused black spotting on the fruit and foliage. (4) 1 p.p.m. Acti-dione plus 3 oz. Triton with or without the addition of 1 lb. captan per 100 gal. water stopped development of downy mildew (*Plasmopara viticola*) on the highly susceptible Concord grapevine variety.—Univ. Mo., Columbia.

Other trees and shrubs.

(*See also* 1422, 1430, 1654, 1963, 1964, 2053a, d, f, i-k, m, n, p, t, y, 2054a-d, i, 2307.)

2029. Sabourin, L., and others.
Arbustes d'ornement. (**Ornamental shrubs.**)
Jardins d'Aujourd'hui, 1955, Fasc. 14, pp. 421-45, illus.

This number is devoted to many aspects of the culture of ornamental shrubs in the garden. It includes articles on shrubs flowering in the various seasons, shrubs for hedges, autumn foliage and fruit, evergreens, hydrangeas, and shrubs for acid soils.

2030. Carra, P., Théau, A., and Benazouz, O.
Arbres d'alignement et de jardin. (**Roadside and garden trees.**)
Rev. hort. Algér., 1955, **59**: 55-64, 88-94, 117-29, 147-61, 180-92, 224-33 and 258-70, illus.

The first four instalments of this article have already been mentioned in *H.A.*, 25: 4240. The trees discussed belong to 7 palm genera (including notes on frost resistance), 10 coniferous genera, 15 evergreen genera (including *Casuarina*, *Eucalyptus*, *Ficus* and olive), and 41 deciduous genera (including *Ailanthus*, *Cinnamomum*, *Diospyros kaki*, *Liriodendron*, mulberry, poplar, willow and some nuts).

2031. Wells, J. S.
Growing in containers.
Amer. Nurserym., 1956, **103**(2): 75, 106-8.
Some points on the growing of shrubs in containers are discussed. A soil mixture which has proved satisfactory is 1 part of fine sand, preferably windblown coastal sand, to 1 part of peat. The pH is adjusted by the addition of dolomitic limestone. Azaleas grow better in peat with 25% redwood shavings. Frequent watering and feeding of container-grown plants is essential, and regular pruning must be practised.

2032. Coggeshall, R. G.
Forcing woody plants for flower shows.
Amer. Nurserym., 1956, **103**(2): 7-8, 62-3, illus.
Data are given on the methods used and the time needed for forcing some early-flowering shrubs. Species forced included *Chaenomeles*, *Deutzia*, *Forsythia*, *Lonicera*, *Magnolia*, *Malus*, *Pieris*, *Prunus*, *Rhododendron*, *Spiraea* and *Weigela*.

2033. Fischer, R.
Über das Auftreten von Virussymptomen an Holzgewächsen nach dem Rückschnitt. **(On the occurrence of virus symptoms on woody plants after cutting back.)** [English summary 8 lines.]
PflSch. Ber. Wien, 1955, **15**: 65-77, bibl. 20, illus.
In Austria 2 previously unknown disorders resembling viruses occurred on lilac and elder after they had been cut back in the winter. The intensity of symptom expression paralleled intensity of growth. The possible causes of the phenomena are discussed.

2034. Toole, E. R.
Performance of wilt-resistant mimosa trees in high-hazard areas.
Plant Dis. Reptr, 1955, **39**: 874, bibl. 1.
Fusarium oxysporum f. *perniciosum* causes severe losses of *Albizzia julibrissin* in the south-eastern United States. In 1949 116 trees, vegetatively propagated from 10 resistant clones, were planted in wilt-infected areas. They have survived well, only one having been recorded as dying from wilt. Two of the clones are available under the names of Tryon and Charlotte.—S. For. Exp. Stat., For. Serv., U.S.D.A. [See also *H.A.*, 19: 1455.]

2035. Kiplinger, D. C., and Nelson, K. S.
Nitrogen affects multiple flower bud formation in Coral Bells azalea.
Ohio Fm Home Res., 1955, **40**: 78.
In tests in which ammonium sulphate was the source of N and the nitrate N range in the peat moss was maintained at 4 levels ranging from 0 to 75 p.p.m. flowering was best at the highest level. With plants with a 3–5-in spread the percentage of non-flowering or blind shoots and the number of multiple-budded shoots per plant were 6 and 16·7 respectively with 50–75 p.p.m. nitrate, 9 and 16·0 with 25–50, 10 and 10·5 with 10–25, and 41 and 0·8 with 0–10 p.p.m. Plants with a 5–7-in. spread produced more multiple buds, but the response to nitrate showed a similar trend. Where fertilizer is applied by hand, fortnightly applications are recommended. Where fertilizer is injected into the irrigation system applications should be frequent enough to maintain nitrate at 25–50 p.p.m.

2036. Royal Horticultural Society.
The rhododendron and camellia year book, 1956, No. 10.
R.H.S., London, 1955, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 167, illus., 10s. + 9d. postage, or U.S. $1.65 post free.
Articles are included on the rhododendron collections at Minterne in Dorset and at Stonefield in Argyll, on azaleas in Windsor Great Park, and camellias in Madeira and in a French nursery. H. H. Davidian and J. M. Cowan continue their review of *Rhododendron* species with the *lacteum* series, C. H. J. Williams gives recommendations for growing camellias outside, in tubs and under glass, and L. S. Fortescue contributes notes on the hardiness of some varieties and hybrids of several *Camellia* species. Ten well-known growers contribute to a symposium on "My favourite rhododendrons". Many *Rhododendron* and *Camellia* species are described, and reports on shows in England and Washington State are included.—[See also separate abstracts.]

2037. Knight, F. P.
The propagation of camellias.
R.H.S. Rhododendron Camellia Yearb. 1956, No. 10, pp. 60-4.
Notes are given on propagation from seed and by layering, air-layering, stem cuttings, leaf-bud cuttings, and grafting.—R.H.S. Gdns, Wisley.

2038. Symon, D. E.
Polyembryony in *Cassia*.
Nature, 1956, **177**: 191, bibl. 2.
Polyembryony was found to be geographically widespread and remarkably common in several Australian species.—Waite agric. Res. Inst., Adelaide.

2039. Bond, G.
A feature of the root nodules of *Casuarina*.
Nature, 1956, **177**: 191-2, bibl. 5, illus.
It has long been known that *Casuarina* root nodules possess a lobed structure as the result of repeated branching and that a root grows out from each nodule lobe. In current culture studies it has been observed that the nodule roots of *C. cunninghamiana* and *C. equisetifolia* show strong upward growth, in some cases attaining a length of 10 cm. and projecting from the surface of the solution.—Dep. Bot., Univ. Glasgow.

2040. Gorenflot, —.
Cycas revoluta Thunb. (***Cycas revoluta.***)
Carra, —.
Renseignements pratiques sur les cycas. **(Practical information on the cycads.)**
Rev. hort. Algér., 1955, **59**: 317-21, illus., and 321-9, illus.
The subjects covered by the first paper are the

morphology, vegetative and sexual reproduction and uses of *Cycas revoluta*. The second paper contains brief notes on *Cycas* and related genera and advice on propagation, transplanting and maintenance in Algeria.

2041. Bell, H. P., and Burchill, J.
Winter resting stages of certain Ericaceae.
Canad. J. Bot., 1955, **33**: 547-61, bibl. 13, illus.

The winter resting stages of 17 species of Ericaceae are described, figured and analysed. From this analysis the following deductions were made: (1) Each species has a fairly definite winter resting stage. (2) As rates of development vary from species to species, the winter resting stage is not in all cases related to the time of full bloom. (3) The embryo sac and anther do not develop at similar rates; hence, for any stage in the development of one, there is not a definite accompanying stage in the development of the other. (4) The Ericaceae were not evolved in a climate which had the marked periodicity and extreme cold characteristic of our present north temperate zone. [Authors' abstract.] —Nova Scotia Res. Found., Halifax, N.S.

2042. Sillans, R.
À propos de l'*Eucalyptus favieri*. (**On *Eucalyptus favieri*.**)
J. Agric. trop. Bot. appl., 1955, **2**: 433-5, bibl. 4, illus.

E. favieri is a very hardy species of which the original plant appeared among sowings made in 1927. It has been grown in southern France and Morocco and is believed to be a *E. coccifera* × *E. linearis* hybrid. Drawings are presented of flowering and fruiting shoots of F_1 and F_2 generations and of *E. coccifera* and *E. linearis*.

2043. Campana, R. J., and Schneider, I. R.
Fungicide tests for control of cedar apple rust on hawthorn.
Plant Dis. Reptr, 1955, **39**: 985-8, bibl. 13, illus.

Experiments showed that smooth-leaved hawthorns (*Crataegus* spp.) are resistant to *Gymnosporangium juniperi-virginianae*. Of 7 fungicides tested on rough-leaved species 2 showed promise, namely, Tag 331 at ½ pint per 100 gal., and Emmi at the same rate.

2044. Panella, A.
Osservazioni sulla germinabilità dei semi duri di sulla. (**Observations on the viability of the hard seeds of French honeysuckle.**)
L'esame rapido della germinabilità del seme di sulla con l'impiego dei coloranti. (**Rapid viability tests on French honeysuckle seeds with colorants.**)
Ann. Fac. Agrar. Perugia, 1953, **9**: 47-54, bibl. 7, and 55-9, bibl. 5.

Recently harvested seeds of *Hedysarum coronarium* were germinated under 4 different sets of conditions. The low germination rate at room temperature of uninjured seeds with the seed coats removed by hand led to the conclusion that all freshly harvested seeds of the species display the phenomenon of hardness. This conclusion was borne out by the high percentage of hard seeds found among uninjured seeds after the seed coats had been removed by machine and they had been subjected for 12 days to alternating temperatures of −5° C. and +30° C. for 6 periods of 24 hours each, with intervals of 24 hours at room temperature between treatments. Viability tests with colorants gave good results with recently harvested seeds but were less accurate with old seeds. Tetrazolium was better than sodium selenite.

2045. Bolli, M.
Anatomia e germinazione del seme di sulla in relazione al fenomeno della durezza. Individuazione del cono di rottura. (**Anatomy and germination of French honeysuckle seed in relation to the phenomenon of hardness. A detailed description of the cone of rupture.**) [English summary 15 lines.]
Ann. Fac. Agrar. Perugia, 1953, **9**: 251-70, bibl. 19, illus.

Investigations showed that all seeds of *Hedysarum coronarium* display the phenomenon of hardness. Immersion in boiling water for 20 minutes resulted in 100% germination. The mechanism of germination is described.

2046. Coggeshall, R. G.
Propagating holly under polyethylene film.
Amer. Nurserym., 1955, **102**(11): 12-13, 80-3, illus.

In the Arnold Arboretum polyethylene has been successfully used to cover the propagation bench after hardwood cuttings of *Ilex* spp. have been inserted. Polyethylene bags have also been used for storing the cuttings at 40° F. for 10–14 days. Rooting was heavier and faster in wounded than in non-wounded cuttings. The best root systems were obtained when wounded cuttings were treated with Hormodin No. 3.

2047. Beyers, E.
New treatments for iron deficiency and blue flowers in hydrangeas.
Fmg S. Afr., 1955, **30**: 407-8, 416, bibl. 6, illus.

Chelates (Fe-EDTA and Fe-HEEDTA) were applied to iron-deficient hydrangeas, either as granules lightly worked in around the plants in August, or as a powder in solution applied in October. Granular Fe-HEEDTA (at 4 oz. per plant) had corrected chlorosis by October; Fe-EDTA treatment was somewhat less effective. Applications of the solution (1 oz. per plant) markedly reduced chlorosis within a month of application. Established hydrangea plants in an alkaline soil were treated with potassium alum to produce blue flowers. The most successful result was obtained with 0·2% sprays applied weekly throughout the flowering season. By lifting the plants and mixing potassium alum with the soil beneath, the flower colour gradually changed to blue.—West. Prov. Fruit Res. Stat., Stellenbosch.

2048. Susini, E.
Il mugherino, o gelsomino del Granduca di Toscana. (***Jasminum sambac.***)
Riv. Ortoflorofruttic. ital., 1955, **39**: 460-3, bibl. in text, illus.

Notes are given on the history, botany, culture and propagation of *Jasminum sambac*. In summer it requires a cool greenhouse, though it can survive in the open in favourable years, and in winter it should be

placed in a greenhouse with a minimum temperature of 14° C. It is propagated by grafting on other jasmine species or, in the case of the double-flowered variety on the single-flowered *J. sambac*, and by cuttings and by marcotting.—Ist. tec. agrar. spec. Firenze (Cascine).

2049. Koshimizu, T., and Hiraiwa, K.
On the distribution and role of hormones in the long-term dormant bud of *Nandina domestica* Thunb. [Japanese, with English summary.]
Jap. J. Ecol., 1954, **4**(2): 55-8, from abstr. in *Biol. Abstr., Sect. D*, 1956, **30**, No. 2704.
The growth-promoting substances contained in the dormant bud of *Nandina* are found in the zones of Rf 0·8–0·9, 0·4–0·5 and 0·0–0·1 of the paper-chromatogram, and the growth-inhibiting substances are found in the zones of Rf 0·5–0·7 and 0·1–0·2. All dormant axillary buds of *Nandina* contain the growth-promoting substances, the younger buds containing more than the older ones.

2050. Keller, J. R., and Shanks, J. B.
Poinsettia root rot.
Phytopathology, 1955, **45**: 552-8, bibl. 28, illus.
There are 2 phases of root rot in greenhouse-grown poinsettias. The first appears when cuttings are rooted and is caused chiefly by species of *Rhizoctonia* and *Pythium*. The second appears as a late season rot just before the plants mature. In older plants, *Thielaviopsis basicola* is the primary pathogen, but root injury is increased when *Rhizoctonia* and *Pythium* are also present. Use of soil with a pH below 5·0 prevented injury from *T. basicola*. A greenhouse night temperature of 70° F. delayed, but did not prevent, *Thielaviopsis* root rot, whereas 50° F. favoured its development. Root rot was also favoured by high soil moisture. Among 11 poinsettia varieties tested for reaction to root rot fungi Pink and St. Louis were the most susceptible and the Indianapolis Reds the least susceptible. [From authors' summary.]—Univ. Md. College Park. [For earlier reports see *H.A.*, 24: 3008 and 4156.]

2051. Yeates, J. S.
Further experience with tip-grafting of rhododendrons.
R.H.S. Rhododendron Camellia Yearb. 1956, No. 10, pp. 91-2, illus.
Tip-grafted plants of rhododendron covered with polythene bags gave the normal percentage of successful grafts, but only when damp sphagnum moss was tied around the unions. A coating of plastic on the grafted scions did not prove a successful alternative to bagging. The plastic bags were removed 5 months after grafting. —Massey agric. Coll., Palmerston North, N.Z. [For earlier work see *H.A.*, 24: 732.]

2052. Maldonado, E.
Gran utilidad de las acacias blancas. (**The many uses of false acacia.**)
Campesino, 1955, **87**(9): 31, 33.
Notes are given on the ecological requirements of *Robinia pseudacacia*, its propagation by seed, nursery practice, planting out and uses.

Noted.

2053.

a Anon.
Der Judasbaum—diesmal als Spalier gezogen. (**The Judas tree—trained as an espalier.**)
Gartenwelt, 1955, **55**: 391, illus.
Cercis siliquastrum grown against a wall.

b Bate-Smith, E. C., Swain, T., and Nördstrom, C. G.
Chemistry and inheritance of flower colour in the dahlia.
Nature, 1955, **176**: 1016-18, bibl. 16.

c Bhandari, M. M.
Further observation on the abnormal flowers of *Delphinium ajacis* Linn.
Sci. and Cult., 1956, **21**: 371-2, bibl. 1, illus.

d de Blois, P.
L'amateur et le forçage des arbustes à fleurs. (**The amateur and the forcing of flowering shrubs.**)
Courr. hort., 1955, **17**: 311-13, 338-9, 368-70, illus.
Azaleas and shrubs for cutting.

e Boke, N. H.
Dimorphic areoles of *Epithelantha*.
Amer. J. Bot., 1955, **42**: 725-33, bibl. 15, illus.
Position of *E. micromeris* in the Echinocactaceae questioned.

f Bordas, J.
Suites d'observations et de traitements sur les platanes dépérissants d'Annecy. (**A series of observations on and treatments for degenerating plane trees in Annecy.**)
C.R. Acad. Agric. Fr., 1955, **41**: 563-6.

g Brockie, W. B.
New Zealand alpine buttercups. Some species of unusual interest.
N.Z. Gdnr, 1955, **12**: 91-5, illus.
Wild *Ranunculus* species.

h Burgue, F.
Les soins aux plantes d'appartement. (**The care of house plants.**)
Jardins Fr., 1956, **129**: 14-19, illus.
Cultural details with examples.

i Chakraverti, D. N.
Leaf-teratology in *Nyctanthes arbor-tristis* L.
Sci. and Cult., 1955, **21**: 336-8, bibl. 11, illus.

j Cuenot, G.
Le *Spathodea campanulata*. (***Spathodea campanulata.***)
Rev. hort. Algér., 1955, **59**: 292-3, bibl. 3, illus.
In Morocco.

k Dorsman, C.
Boomkwekerijen in West-Duitsland. (**Nurseries in Western Germany.**) [English summary ½ p.]
Meded. Dir. Tuinb., 1956, **19**: 16-29, illus.
A general account.

l HANNIBAL, L. S.
A few practical aspects of breeding various amaryllis.
J. roy. hort. Soc., 1955, **80**: 515-21, bibl. 2, illus.

m HARRIS, J. H., HASSIS, F. A., AND SMITH, C. F.
Azaleas and camellias.
Ext. Circ. N.C. agric. Ext. Serv. **246**, revised 1955, pp. 31, illus.
Varieties, culture, propagation, diseases, pests and insecticides.

n JOHNSTONE, G. H.
Camellia "Donation".
J. roy. hort. Soc., 1955, **80**: 544-5, illus.
A *C. saluensis* × *C. japonica* hybrid.

o JOHNSTONE, K. H.
Daffodils of commercial promise.
Comm. Gr, 1956, No. 3138, pp. 319-21, illus.
Some new varieties.

p JOHRI, B. M., AND KONAR, R. N.
A contribution to the morphology and embryology of *Ficus religiosa* Linn.
Curr. Sci., 1955, **24**: 382-5, bibl. 4, illus.

q LIER, F. G.
The origin and development of cork cambium cells in the stem of *Pelargonium hortorum*.
Amer. J. Bot., 1955, **42**: 929-36, bibl. 11, illus.

r LOTTI, A.
La "terra universale" del Prof. Fruhstorfer. **(The standard potting soil of Prof. Fruhstorfer.)** [English and German summaries 10 and 14 lines.]
Riv. Ortoflorofruttic. ital., 1955, **39**: 534-47, illus.
See *H.A.*, 24: 620.

s MAGIE, R. O., AND COWPERTHWAITE, W. G.
Commercial gladiolus production in Florida.
Bull. Fla agric. Exp. Stats **535**, 1954, pp. 67, illus.

t MARKGRAF, F.
Eine buntblättrige Myrsinacee der botanischen Gärten. **(A variegated Myrsinacea from the [Munich] botanical gardens.)**
Gartenbauwiss., 1955, **2**: 192-4, illus.
Ardisia malouiana.

u DE MOL VAN OUD LOOSDRECHT, W. E.
Der Einfluss der Röntgenstrahlen auf die Entwicklung des Pollens und der Sprosse bei Tulpen. II. Die Bestrahlung vor, während oder nach der Meiosis. **(The effect of X-rays on the development of tulip pollen and shoot. II. Radiation before, during and after meiosis.)**
Gartenbauwiss., 1955, **2**: 40-57, bibl. 1.
For earlier work see *H.A.*, 25: 4221.

v DE MOL VAN OUD LOOSDRECHT, W. E.
Der Einfluss der Röntgenstrahlen auf die Entwicklung des Pollens und der Sprosse bei Tulpen. III. Der Einfluss der Temperatur. **(The effect of X-rays on the development of tulip pollen and shoot. III. The effect of temperature.)**
Gartenbauwiss., 1955, **2**: 165-91, bibl. 1.

w DE MOL VAN OUD LOOSDRECHT, W. E.
Die ersten durch Colchicin-Behandlung gewonnenen tetraploiden Formen von *Crocus aureus*. (Vorläufige Mitteilung.) **(The first tetraploid form of *Crocus aureus* resulting from colchicine treatment. Preliminary report.)**
Gartenbauwiss., 1955, **2**: 114.

x OLIVER, R. W.
Planning farm home grounds.
Publ. Canada Dep. Agric. **959**, 1955, pp. 10, diagrams.

y OVINGTON, J. D.
The composition of tree leaves.
Forestry, 1956, **29**: 22-8, bibl. 14.
Including that of *Castanea sativa* and *Chamaecyparis lawsoniana.*

z PUTTARUDRIAH, M.
A dangerous horticultural insect pest.
Lal-Baugh, 1956, **1**(1): 28-31, bibl. 3, illus.
The lantana bug (*Orthesia insignis*) in Mysore and its control.

2054.

a RAO, C. V.
Endosperm and seed development in *Chrysalidocarpus lutescens* H. Wendel.
Curr. Sci., 1955, **24**: 381-2, illus.
An ornamental palm.

b RAO, J. S.
Stomata in the flower of *Thespesia populnea* Cav.
Sci. and Cult., 1955, **21**: 330, bibl. 3.

c RAO, V. S., AND SIRDESHMUKH, K.
The perianth of *Saraca indica*.
Proc. Indian Acad. Sci., Sect. B, 1955, **42**: 311-15, bibl. 1, illus.
Anatomy of abnormal flowers [see also *H.A.*, 24: 1813r].

d SCHUDER, D. L.
Pests of *Taxus, Euonymus* and others.
Amer. Nurserym., 1956, **103**(1): 11-12, 111-14, illus.
And their control in Indiana.

e SEIKEL, M. K.
The chemistry of flower pigmentation in *Antirrhinum majus*. V. Pigments of yellow *Antirrhinum majus*, genotype ppmmyy.
J. Amer. chem. Soc., 1955, **77**: 5685-8, bibl. 19.
For earlier parts see *H.A.*, 24: 2950 and 25: 3159j and 3159m.

f SHOKRI, I. S.
The effect of ethylene on stomata of *Pelargonium zonale*.
Bull. Inst. Egypt, 1955, **36**(1): 269-86, from abstr. in *Bull. sci. tech. Docum. Cent. Cairo*, 1955, Vol. **1**, No. 2, Part 2, No. 1-100245.
Ethylene at 0·1% had no effect, but at 1% caused closure.

g STOUT, A. B.
New daylilies in 1956.
Gdn J. N.Y. bot. Gdn, 1956, **6**: 9-11, illus.
Newly named hemerocallis seedlings raised by the N.Y. bot. Gdn.

h SUBRAMANYAM, K.
Morphological studies of some species of *Sedum*. I. Floral anatomy.
Amer. J. Bot., 1955, **42**: 850-5, bibl. 9, illus.

i VEDEL, H.
Frøformering af *Hedera helix*. **(Propagation of ivy from seed.)** [Danish, with English summary.]
Dansk dendrol. Årsskr., 1955, **3**: 278-82, from abstr. in *Biol. Abstr., Sect. D*, 1956, 30, No. 5936.

j VICKERY, R. K., JR.
Hybridizations in *Mimulus guttatus* (Scrophulariaceae).
Proc. Utah Acad. Sci., 1954-1955, **32**: 212-13.

k WOODVILLE, H. C.
The control of bulb fly damage.
R.H.S. Daffodil Tulip Yearb. 1956, *No. 21*, pp. 75-8, bibl. 1.
15-minute dip can foil the bulb fly.
Grower, 1956, **45**: 214-15, illus.
See *H.A.*, 26: 920.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

Avocadoes.

(*See also* 2148e, y.)

2055. EMBLETON, T. W., JONES, W. W., AND KIRKPATRICK, J. D.
Avocado fertilizer experiments.
Yearb. Calif. Avoc. Soc. for 1955, pp. 62-6, bibl. 1.
Progress is reported from 2 fertilizer experiments on the application of nitrogen to avocado trees. Trees receiving spring applications of N gave lower yields in the first 2 years than trees receiving no N, but produced higher yields in the third year. Fruits from no-N trees were larger, but the difference decreased each year. In the second experiment 3 varieties received 3 levels of N. In the MacArthur variety yields decreased with increased N doses, but no consistent trends were apparent with either Hass or Fuerte. It is concluded that greater yields may be obtained by maintaining 1·8% N in the leaves in August and September than by increasing the N level to more than 2%. There was indication that cattle manure was not an efficient source of N when applied to uncultivated avocado orchards.

2056. HAAS, A. R. C., AND BRUSCA, J. N.
Phosphate response in avocado trees.
Yearb. Calif. Avoc. Soc. for 1955, pp. 193-201, illus.
Young seedlings and budded avocado trees were grown in a nutrient solution at several P_2O_5 levels. Top and root growth increased with increasing P_2O_5 concentrations. Symptoms resembling nitrogen deficiency were apparent in trees receiving no phosphate. It was also noticed that symptoms of sunblotch did not appear on Caliente (Mexican) seedlings before or after budding with healthy buds of a Fuerte-Carr hybrid, but symptoms did appear on new growth after severe pruning of the budded tree.—Univ. Calif., Riverside.

2057. WALLACE, A., AND OTHERS.
Glasshouse studies on the salt tolerance and growth of *Persea floccosa* as a rootstock.
Yearb. Calif. Avoc. Soc. for 1955, pp. 179-83, bibl. 8.
Grafts and cuttings of *Persea floccosa* and 3 varieties of *P. americana* were compared in studies on salt tolerance and growth. Fourteen days after the application of 25 g. NaCl per pot all plants showed some degree of injury; 180 days after application Na concentrations remained high in leaves of *P. floccosa* cuttings, although they had declined almost to zero in the avocado varieties. Twenty-four days after the application of 5 g. NaCl per plant all Fuerte plants on Topa Topa or *P. floccosa* roots showed some tip-burn; this was established as Cl rather than Na injury. The weights of leaves, twigs, branches and roots indicated that *P. floccosa* may be a dwarfing rootstock.—Univ. Calif., Los Angeles.

2058. BRUSCA, J. N., AND HAAS, A. R. C.
Chromium effects on avocado trees.
Yearb. Calif. Avoc. Soc. for 1955, pp. 170-1, illus.
Harman avocado seedlings were grown in a nutrient solution to which low levels of potassium chromate had been added. The addition of Cr proved beneficial to growth.—Univ. Calif., Riverside.

2059. BRUSCA, J. N., AND HAAS, A. R. C.
Effect of molybdenum on avocado trees.
Yearb. Calif. Avoc. Soc. for 1955, pp. 175-8, illus.
In an initial test there were indications that Mo supplied in a nutrient solution to a silica sand culture stimulated avocado growth. In additional tests the presence of Mo in the nutrient solution greatly stimulated the growth of both seedlings and budded trees.—Univ. Calif., Riverside.

2060. GILLESPIE, H. L.
Night temperature influence on Fuerte bearing habits.
Calif. Citrogr., 1956, **41**: 153-4.
Records in a commercial orchard indicate that fruit set and retention in Fuerte is adversely affected if the night temperature falls below 47° F. during flowering. When night temperatures remained above 47° F. during flowering, the crop was retained even during subsequent periods of lower temperature.

2061. Schroeder, C. A.
Pollen production in avocado.
Yearb. Calif. Avoc. Soc. for 1955, pp. 184-6, bibl. 4.

Pollen counts were made on many avocado varieties to ascertain whether pollen production was a limiting factor in fruit set. All the commercial varieties studied produced adequate numbers of pollen grains. Pollen production of the Fuerte variety varied according to environmental conditions.—Univ. Calif., Los Angeles.

2062. Peterson, P. A.
Avocado flower pollination and fruit set.
Yearb. Calif. Avoc. Soc. for 1955, pp. 163-9, bibl. 11, illus.

Investigations on caged Zutano and Hass trees are described [for a shorter account see second paragraph of *H.A.*, 25: 3168]. In 5 other varieties, in which trees were protected against bee pollination, no fruit set occurred without hand pollination, except in the case of the variety Clifton.—Univ. Calif., Riverside.

2063. Winslow, M. M., Miller, M. P., and Enderud, J.
Topworking avocado varieties.
Calif. Agric., 1955, **9**(12): 9-10, 13, illus.

When avocado trees up to 10 years old are to be topworked the trunk is cut down to about 1 foot above the soil surface. Grafting is usually done in February at Riverside, although satisfactory results have been obtained up to April and again in the autumn. The methods used are the notch and the bark graft, which are described with illustrations. In a top-worked tree, therefore, there are 3 components, namely the rootstock, an intermediate of the original variety and the new scion variety.—Univ. Calif., Riverside.

2064. Zentmyer, G. A., and Schroeder, C. A.
Further evidence of resistance to *Phytophthora* rootrot of avocado.
Yearb. Calif. Avoc. Soc. for 1955, pp. 84-6.

Trees of *Persea borbonia* and *P. skutchii* have so far shown a high degree of resistance to inoculum of *Phytophthora cinnamomi*. Cuttings from a Duke seedling have also shown appreciable resistance.—Univ. Calif., Riverside and Los Angeles. [See also *H.A.*, 24: 4174.]

2065. Bingham, F. T., and Zentmyer, G. A.
Phytophthora root rot of avocado in relation to nitrite.
Yearb. Calif. Avoc. Soc. for 1955, pp. 187-92, bibl. 4, illus.

In pot cultures the resistance of avocado seedlings to root rot (*Phytophthora cinnamomi*) was not reduced by the addition of 2 p.p.m. nitrite-N to the nutrient solution. Laboratory experiments showed that mycelial growth was inhibited at pH 4·5 when 6 p.p.m. nitrite-N was present. Germination of *Phytophthora citrophthora* zoospores was reduced by nitrite-N applications.—Univ. Calif., Riverside.

2066. Fleschner, C. A., Hall, J. C., and Ricker, D. W.
Natural balance of mite pests in an avocado grove.
Yearb. Calif. Avoc. Soc. for 1955 pp. 155-62, illus.

During an 84-day period all beneficial mite species were removed by hand from part of an avocado tree. Populations of omnivorous looper (*Sabulodes caberata*), 6-spotted mite (*Eotetranychus sexmaculatus*) and long-tailed mealybug (*Pseudococcus adonidum*) developed to a serious extent. Relatively high populations of avocado brown mite (*Oligonychus punicae*) and latania scale (*Hemiberlesia lataniae*) also developed. It was found that over 90% of the larvae of the omnivorous looper were parasitized by wasps. On DDT-sprayed trees high populations of 6-spotted mites developed; predator mites on control trees checked such increases.

2067. Young, T. W., and Ruehle, G. D.
The role of the burrowing and meadow nematodes in avocado decline.
Plant Dis. Reptr, 1955, **39**: 815-17, bibl. 4.

Radopholus similis and *Pratylenchus brachyurus* are widespread on avocado trees in Florida [see also *H.A.*, 25: 3171] and cause approximately equal root damage. High populations of either or both nematodes do not apparently always result in systematically spreading decline or seriously retarded top growth, as happens with citrus which is heavily infested with *R. similis*.—Univ. Fla, sub-trop. Exp. Stat., Homestead.

2068. Lindgren, D. L., Sinclair, W. B., and Stupin, P. J.
Tolerance of avocado fruits of different varieties to fumigation with ethylene dibromide.
Yearb. Calif. Avoc. Soc. for 1955, pp. 202-8, bibl. 1.

Avocado fruits of 5 varieties were fumigated with various concentrations of ethylene dibromide for different periods, and were subsequently observed in storage. Fuerte fruits were not injured by fumigation for 2 hours with 1, 2 or 3 lb. ethylene dibromide per 1,000 cu. ft. Severe injury resulted from fumigation with 1·5 lb. ethylene dibromide for 4 hours. MacArthur, Anaheim and El Tropico fruits were injured after 2 hours' fumigation with 2 lb. per 1,000 cu. ft., and severe injury was caused by 3 lb.—Univ. Calif., Riverside.

2069. Eaks, I. L., and Sinclair, W. B.
Respiratory response of avocado fruits to fumigation effective against the eggs and larvae of fruit flies.
J. econ. Ent., 1955, **48**: 369-72, bibl. 5.

Fumigation of avocado fruits with ethylene dibromide, ethylene chlorobromide and methyl bromide resulted in a striking stimulation in the rate of fruit respiration. In general the rate of deterioration was faster at higher rates of carbon dioxide production. The degree of stimulation was related to the dosage of the fumigant in most cases.—Univ. Calif. Citrus Exp. Stat., Riverside.

Citrus—general.

(*See also* 1292, 1293, 1376, 2148a, b, f, g, l, m, o, p, t, u, 2306b, 2310, 2331.)

2070. Sharp, G. G. R.
Caribbean citrus: second to none.
New Commonw., 1955, Vol. **30**, No. 11, Suppl. pp. xii-xiii.

The following aspects of the British Caribbean citrus

industry are discussed: economic problems, production of orange concentrate in Jamaica and British Honduras, production of the Ugli (grapefruit × tangerine) and the Ortanique (orange × tangerine) in Jamaica, lime growing in Dominica, future prospects.

2071. Basson, W. J.
The cultivation of citrus orchards.
Fmg S. Afr., 1955, **30**: 439-43, 446, bibl. 9, illus.

The two different points of view on the cultivation of citrus orchards are reviewed, namely, whether the soil should be loosened and kept loose, or whether it should be left undisturbed. The systems most commonly applied in South Africa are discussed. [From author's summary.]—Citrus subtrop. hort. Res. Stat., Nelspruit.

2072. Basson, W. J.
***Glycine javanica* as a permanent legume in subtropical citrus orchards.**
Fmg S. Afr., 1955, **30**: 411-12, illus.

Trials and observations in the Eastern Transvaal have indicated that *Glycine javanica* is a promising permanent legume in citrus orchards in areas of high rainfall or where there is plentiful irrigation water. It may also help to solve irrigation and erosion difficulties in poorly planned orchards or where the ground is sloping and the soil shallow. The advantages and disadvantages of the cover crop are discussed and its establishment and culture are described.—Citrus and subtrop. hort. Res. Stat., Nelspruit.

2073. Schneider, H.
Ontogeny of lemon tree bark.
Amer. J. Bot., 1955, **42**: 893-905, bibl. 11, illus.

The developmental anatomy of lemon bark has been traced from below the apical meristem to levels of secondary growth.—Univ. Calif., Riverside.

Citrus—varieties, rootstocks and propagation.

(*See also* 2148r.)

2074. Ullah, H., and Ali, S.
Some physico-chemical characteristics of important mandarin orange varieties in the Punjab.
Pakistan Rev. Agric., 1955, **2**: 58-60, 94.

Eighteen fruit characters were studied in 3 American, 1 Australian and 4 Indian varieties in a trial planted at Lyallpur Experimental Fruit Garden 15 years ago. The American Kinnow and the Australian Feutrell's Early proved to be not only suitable substitutes for, but also in some respects superior to, the Nagpuri Sangtra mandarin.

2075. Escalante, M. G.
Contribución al conocimiento de la estructura del fruto de los naranjos Valencia y Lue Gim Gong (*Citrus sinensis* (L.) Osbeck). (**Contribution to knowledge of the structure of the fruit of the Valencia and Lue Gim Gong oranges (*Citrus sinensis*).**)
Rev. Invest. agríc. B. Aires, 1955, **9**: 211-17, bibl. 6, illus.

Morphological and anatomical studies indicate the fruit characters on which differentiation between the two varieties can be based. Lue Gim Gong is thought to be a Valencia × Dulce del Mediterráneo cross. Analysis of the characters demonstrates the superiority of Valencia.

2076. Martin, J. P., Bitters, W. P., and Ervin, J. O.
Replant studies with rootstock seedlings.
Calif. Citrogr., 1955, **41**: 70-2, illus.
Citrus replant seedling tests.
Calif. Agric., 1956, **10**(1): 8, 10, illus.

Six different seedling rootstocks were planted in pots containing two old citrus soils and an old walnut soil. All seedlings grew better in the walnut soil than in the citrus soils. Troyer citrange rootstocks showed the least growth depression in the citrus soils. In a second test with a soil new to citrus plantings, trifoliate orange seedlings reduced the growth of subsequent plantings of several varieties less than did sour orange, Troyer citrange, Rangpur lime or Cleopatra mandarin, and also grew better than these varieties as a replant. The effect of Cleopatra mandarin in reducing the growth of succeeding crops of seedlings was less than that of sour orange, sweet orange, Troyer citrange or Rangpur lime, but it was itself the poorest replant seedling.—Univ. Calif., Riverside.

2077. Wallace, A., and Smith, R. L.
Rootstock influence on the potassium, calcium, magnesium nutrition of citrus.
Bett. Crops, 1955, **39**(9): 9-14, 44-7, bibl. 20.

Citrus rootstocks have the ability to impose a different pattern of mineral nutrition upon leaves of the scion species. This ability appears to be related in part to the cation exchange capacity (CEC) of root surfaces. The approximate CEC values of rootlets of rough lemon, sweet orange, grapefruit and sour orange are 30, 23, 21 and 25 me. per 100 g. dry roots respectively. The relationships between pairs of species for the K, Ca and Mg contents of citrus leaves are expressed as a mathematical equation, namely $\frac{CEC_1}{CEC_2}=\left(\frac{Ca_1}{Ca_2}\right)^2=\frac{K_2}{K_1}=\frac{Mg_1}{Mg_2}$. The exact method for expressing the magnesium is as yet somewhat obscure.—Univ. Calif., Los Angeles.

2078. Chapot, H.
Remarques sur la germination des pépins de *Poncirus trifoliata* (Rafin). (**Remarks on the germination of seeds of *Poncirus trifoliata*.**)
Fruits d'Outre Mer, 1955, **10**: 465-8, bibl. 2, illus.

An account is given of recent investigations on seeds from trifoliate orange trees growing at Rabat. *Germination:* Poor results having been obtained with dried seeds from various sources, the effect of moisture on stored seeds was studied. The germination rates of seeds (1) sown in the open immediately after harvesting, (2) stratified in a humidifier at 4° C. from October to March, (3) dried and stored at 4° C. from October to March, and (4) stored without special precautions for over a year were 80, 50, 3 and nil % respectively. *Polyembryony:* A sample of 100 seeds showed a moderate degree of polyembryony (78% with 2 or more embryos), a wide variation in the number of embryos per seed (1–8) and a high coefficient of variation, namely, 77%. Of 855 seeds sown 94·9% yielded 1 plant, 4·8% 2 plants and 0·2%

3 plants; thus most of the extra embryos did not survive. *Albinism:* Seedlings from the Rabat trees exhibited a very high rate of albinism, those from monoembryonic seeds having 3 and those from polyembryonic seeds 4 colour forms. All the seedlings from a given polyembryonic seed have the same colour form.—Inst. Fruits Agrumes colon., Morocco.

Citrus—tree composition and nutrition.

(*See also* 1695, 2148q.)

2079. Crider, F. J.
All citrus tree surfaces absorb plant food.
Calif. Citrogr., 1955, **41**: 73-5, illus.

Nutrient solutions containing phosphate and nitrate were held in contact with all parts of orange and grapefruit seedling and budded trees. Phosphate and nitrate were absorbed by all plant parts to a greater or lesser extent, the more actively growing members showing the greatest absorptive capacity. The rates of absorption by elongating shoots and by elongating rootlets were almost identical.—Dep. Hort., Univ. Ariz.

2080. Ford, H. W.
Root distribution of citrus trees.
A.R. Fla agric. Exp. Stats, 1954, p. 181.

Applications of 9 and 18 g. of iron, as Fe-EDTA, to Fe-deficient trees improved feeder root development and survival in the autumn. Young orange trees received applications of 3 levels of N, K and Mg; at the highest N level fewer feeder roots were found. In cultivation experiments it was shown that plots cultivated to a depth of 3 in. at fortnightly intervals had the same root concentration as plots cultivated only 3–5 times per year. Ploughing to a depth of 6 in. reduced root concentration in the 0–10 in. zone and did not increase root development below this zone.

2081. Embleton, T. W., and Jones, W. W.
Manure as a source of nitrogen.
Calif. Citrogr., 1955, **41**: 79-80, bibl. 1.
Calif. Agric., 1956, **10**(1): 14-15.

In a cultivated grove of Navel oranges yield and leaf N were similar in trees fertilized with organic manure or with calcium nitrate. However, Valencias growing in a non-cultivated grove did not benefit from manure as much as from ammonium nitrate. Similarly, ammonium nitrate applied to a cultivated avocado orchard gave as good results as manure, but was better than manure in a non-cultivated orchard.

2082. Jones, W. W., and Steinacker, M. L.
The quantitative determination of biuret in urea.
Hort. News Lett. Univ. Calif. Citrus Exp. Stat. **7**, 1955, pp. 3.

Biuret, commonly present in urea, causes "yellow tip" in citrus leaves. Urea containing more than 0·25% biuret should not be used as a citrus foliage spray. A quantitative method of determining biuret in urea based on the qualitative biuret colour reaction of proteins is presented.

2083. Wander, I. W.
The total manganese, copper and zinc content of soils used for citrus production in Florida.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 27-36, bibl. 8.

Analyses were made for total Mn, Cu and Zn in soil samples from an experimental block before and after 15 years' treatment with fertilizers and sprays containing these elements. At pH 5·5–6·0, 90% of the Cu, 69·5% of the Mn, and 63·5% of the Zn applied was retained in the top 6 inches of the soil. At pH ±4·3, 46% of the Cu, 7·8% of the Zn and 1·7% of the Mn applied was retained in the top 6 inches. A survey of commercial groves showed considerable accumulations of Mn, Zn and Cu by comparison with amounts found in 1937 before these elements were widely used in fertilizers. No significant correlation was found between total Cu in soils from commercial groves and the incidence of chlorosis.—Fla Citrus Exp. Stat., Lake Alfred.

2084. Raciti, G.
Il ferro, elemento indispensabile nella nutrizione degli agrumi. (**Iron, an essential element in citrus nutrition.**)
Riv. Agrumic., 1956, **1**: 129-32, illus.

In the Sicilian districts of Lentini and Carlentini, where lime-induced chlorosis in citrus is widespread, tests showed that the Fe content of chlorotic leaves was always below 0·0055% dry matter while that of healthy leaves was not less than 0·0068%. Control experiments were carried out on lemons, oranges and mandarins with proprietary iron chelates (EDTA) applied in different ways, but all were unsuccessful except trunk injections under pressure of 2 l. of 0·05% Chel 330. This treatment cleared the chlorosis in 2 months, but on flushing the symptoms reappeared in the new leaves.

2085. Leonard, C. D., Stewart, I., and Wright, J. D.
Reduction of fruit burn with pelletized FeEDTA.
Citrus Mag., 1955, **18**(4): 17, 24-6, bibl. 1, illus.

The application to citrus trees of a dusty form of chelated iron by a mechanical distributor may cause burn and drop of mature fruits, as the distributor causes the iron particles to rise and settle on the fruit. Tests were made with several forms of FeEDTA applied by distributor with the spring fertilizer dressings in orange groves. Pelleted forms resulted in considerably less fruit burn and drop than powdered forms.—Fla Citrus Exp. Stat., Lake Alfred, and Geigy agric. Chemls, Orlando.

2086. Raciti, G.
Il magnesio e la sua carenza negli aranci. (**Magnesium deficiency in oranges.**)
Riv. Agrumic., 1955, **1**: 55-63, illus.

Information given on Mg deficiency in oranges in Sicily includes distribution, affected varieties (Sanguinello being the most susceptible), symptoms and control including a study on the effects of other elements on Mg deficiency. Soil application of 250 g. magnesium sulphate per tree in spring caused virtually complete disappearance of the symptoms in 4 months. Foliar application of magnesium sulphate plus sodium carbonate gave partial control.

2087. Bingham, F. T., McColloch, R. C., and Aldrich, D. G.
Interrelation of soil potassium and magnesium.
Citrus Leaves, 1956, **36**(1): 6-7, 20, bibl. 1, and *Calif. Citrogr.*, 1956, **41**: 122, 132-4, bibl. 1.

Soil and leaf analyses were made in field experiments involving Mg and/or K fertilization of orange trees. The Mg concentration in spring-cycle leaves was related to the severity of leaf symptoms of Mg deficiency. Deficiency symptoms were associated with leaf Mg concentrations of 0·2% or less. Magnesium applications resulted in increased leaf Mg and the disappearance of deficiency symptoms. Potassium applications aggravated Mg-deficiency symptoms. The ratio of exchangeable K/Mg was closely correlated with Mg status of the trees; it is suggested that this ratio may be used as a diagnostic method for estimating the Mg status of citrus soils.—Univ. Calif., Riverside and Davis.

2088. Brusca, J. N., and Haas, A. R. C.
Growth of citrus as affected by molybdenum.
Calif. Citrogr., 1956, **41**: 158-9, illus.

Molybdenum deficiency symptoms on grapefruit seedlings growing in pots were corrected by the addition of 1 p.p.m. Mo, as sodium molybdate, to the nutrient solution. In glasshouse tests the continuous use of 0·025 p.p.m. Mo in the nutrient solution had a good effect on growth of Koethen sweet orange seedlings. Larger Valencia trees on sour orange responded favourably to 0·05 p.p.m. Mo in the nutrient solution. Rooted Prior Lisbon cuttings were stimulated by 0·05 and 0·1 p.p.m. Mo, but were retarded by 5 p.p.m. Mo in the nutrient solution.

2089. Cooper, C. M.
Applying zinc sprays to citrus.
J. Dep. Agric. S. Aust., 1955, **59**: 151-2, 160, illus.

Zinc deficiency occurs on all soils in the Upper Murray Irrigation areas and the application of zinc sulphate plus lime at 10–5–100 as a corrective or 5–2½–100 as a maintenance spray is general. Application from a drive-past boom in early summer is recommended. It reduces costs by 80% compared with hand spraying and is more satisfactory than application in mixture with the white oil spray used for scale control.

Citrus—various climatic and cultural aspects.

(*See also* 2148x.)

2090. Ziegler, L. W.
Irrigation studies with Marsh grapefruit on Lakeland fine sand in central Florida.
Citrus Ind., 1956, **37**(2): 27-9, 33, bibl. 6.
Practical considerations with regard to irrigation of citrus in Florida.
Citrus Mag., 1956, **18**(5): 32, bibl. 2.

Irrigation studies were carried out on Lakeland fine sand planted with Marsh grapefruit on rough lemon rootstock, during 4 crop years. Irrigation treatments increased the yield of boxes per tree, but differences were only significant in years of light rainfall. The soluble solids and acid contents of the fruit were decreased by irrigation. Irrigation appeared to be of economic value only in years of low spring rainfall. —Univ. Florida.

2091. Frith, H. J.
Trials of a wind machine for frost protection in citrus.
Aust. J. agric. Res., 1955, **6**: 903-12, bibl. 4, illus.

The Australian wind machine tested consisted of a steel tower bearing a rotating turntable which carried two opposed motors and airscrews. The axis of the blades is 35 ft. from the ground. Rotation of the turntable, at a speed of 360° in 7 minutes, is effected by means of a separate chain drive powered by a ⅓ h.p. motor. The main motors are each of 40 h.p. (manufacturers' rating) and drive airscrews of 12 ft. diameter at 635 r.p.m. The machine was effective in raising orchard temperature by 2° F. over an area of up to 10 acres at a power expenditure of 12 h.p. (electrical input) per acre, which is comparable to results obtained with similar machines in California and with the low-speed Australian type of wind machine.—Irrig. Res. Stat., C.S.I.R.O., Griffith, N.S.W.

2092. Darley, E. F., Middleton, J. T., and Kendrick, J. B., Jr.
Sulfur dioxide injury on citrus.
Calif. Agric., 1956, **10**(1): 9, illus.

Sweet and sour orange seedlings were exposed to concentrations of 2·5 p.p.m. and 6·5 p.p.m. SO_2 for 2–6 hours at 72° F. and r.h. 84%. Damage occurred at both concentrations, but only on young leaves which had developed in the relatively warm conditions of the greenhouse. Sweet orange was more sensitive to SO_2 than sour orange; the symptoms on both are described. —Univ. Calif., Riverside. [See also *H.A.*, 25: 4296.]

2093. Hield, H. Z., and Stewart, W. S.
Fruit sizing sprays for oranges and grapefruit.
Calif. Citrogr., 1955, **41**: 46, 58-61, bibl. 8.
2,4-D and 2,4,5-T as fruit-sizing sprays for oranges and grapefruit.
Citrus Leaves, 1956, **36**(2): 10-11, 22, 26, 28, bibl. 8.

The best methods of using 2,4-D or 2,4,5-T sprays to increase citrus fruit size are discussed. In an experiment with Washington Navel oranges May and June applications of 2,4-D increased fruit set as well as fruit size.

2094. Calavan, E. C., DeWolfe, T. A., and Klotz, L. J.
Severe damage to young citrus trees from 2,4-D.
Citrus Leaves, 1956, **36**(1): 8-9, 24, bibl. 6, illus.
2,4-D causing severe damage to young trees.
Calif. Citrogr., 1956, **41**: 82, 114-15, bibl. 6, illus.

Young citrus trees, particularly lemons, have been damaged and sometimes killed by applications of 2,4-D. Few cases of severe damage have been found on trees over 6 years old. Ways of avoiding injury are discussed.—Univ. Calif., Riverside.

Citrus—diseases and pests.

(*See also* 1699, 1997, 2148k.)

2095. Ruggieri, G.
Le arance impietrate. (**Hard fruit in oranges.**)
Riv. Agrumic., 1955, **1**: 65-9, illus.

In Sicily occasional orange trees produce a proportion of small, misshapen, unmarketable fruits with hard skins and dense, brown zones in the albedo. The proportion of hard fruit varies from year to year and may exceed that of normal fruit. The disorder, the cause of which is unknown, is commoner on alluvial than on volcanic soils and has been observed in 10 varieties, notably Sanguinello and Moro.

2096. Schneider, H.
Decline of lemon trees on sour orange rootstock.
Citrus Leaves, 1955, **35**(12): 10-11, 28-9, bibl. 6, illus.
Calif. Citrogr., 1956, **41**: 117-20, bibl. 6, illus.

A disorder of sieve tubes may occur in sour orange rootstocks worked with some lemon strains when the trees are 12–15 years old. The disorder is distinct from lemon sieve-tube necrosis; the principal macroscopic symptom is the necrosis of sieve tubes below the union. It is suggested that the necrosis is caused by some substance from the lemon moving across the union through the sieve tubes. Three types of macroscopic symptom may occur on the cambial face of trunk bark and wood, namely jagged, brown lines around the circumference, whitish raised areas or a honey-comb effect. Tissue modifications, which may accompany the necrosis, are enlarged parenchyma cells, excessive numbers of fibre sheets and enlargement of rays by cell division. Top symptoms may appear soon after the onset of necrosis.—Univ. Calif., Riverside.

2097. Wallace, J. M., Oberholzer, P. C. J., and Hofmeyer, J. D. J.
Distribution of viruses of tristeza and other diseases of citrus in propagative material.
Plant Dis. Reptr, 1956, **40**: 3-10, bibl. 31.

This paper presents evidence that the outbreak of tristeza in South America was closely associated with known importations of citrus nursery trees from South Africa. It also discloses that at least one importation of citrus budwood was infected with tristeza virus when it was received in the United States from South Africa in 1924. However, other evidence is presented that the virus was established in the United States many years earlier and that it is apparently of oriental origin. —[From authors' abstract.]—Univ. Calif., Riverside, and Univ. Pretoria.

2098. Stofberg, F. J., and Loest, F. C.
Combination sprays and formulae for the control of insect pests, diseases and deficiencies in citrus.
Fmg S. Afr., 1955, **30**: 436-8.

Recommendations are made on sprays for the control of scales, mites, black spot, melanose, scab, dry root rot and deficiencies of Zn, Mg and Cu in citrus in general, and for the advancement of fruit maturity in Valencias.—Citrus subtrop. hort. Res. Stat., Nelspruit.

2099. Ruggieri, G., and Goidanich, G.
Il mal secco degli agrumi. (**The mal secco disease of citrus.**)
Reprinted from *G. Agric.*, 1953, No. 3, pp. 14, bibl. 47, illus.

The symptoms, the causative agent and the control of the disease are discussed. Preventive measures include postponing fertilization and deep cultivation, planting out in late winter or early spring to reduce root injury or at least to cause it at a time unfavourable to *Deuterophoma tracheiphila* and, possibly, prophylactic spraying. Control is by the excision of infected parts and the removal of bark from areas of discolored wood. The reconstitution of infected lemon orchards with the resistant Monachello variety is suggested.—Staz. sper. Agrumic., Acireale. [See also *H.A.*, 24: 792.]

2100. Chowdhury, S.
Citrus melanose in Assam and its control.
Sci. and Cult., 1955, **21**: 323-5, bibl. 2, illus.

Melanose, *Diaporthe* (*Phomopsis*)*citri*, occurs in all the citrus-growing areas of Assam. It is of minor importance in young plantations but increases in severity with increasing age. Susceptible varieties are listed and notes are given on symptoms and etiology. Control consists of the pruning and destruction of dead wood combined with spraying with a copper fungicide, preferably 3–3–50 bordeaux oil emulsion. Spraying should take place 1 week after fruit set, 2–3 weeks later and, possibly, again later.—Plant path. Lab., Jorhat, Assam.

2101. Muma, M. H.
Factors contributing to the natural control of citrus insects and mites in Florida.
J. econ. Ent., 1955, **48**: 432-8, bibl. 21.

Results are reported of a survey of the pathogenic agents, parasites and predators of purple and Florida red scales and of rust, red and six-spotted mites on citrus. In unsprayed groves the degree of natural control in Florida red scale was usually adequate, and was comparable with that obtained from the use of insecticides in sprayed groves. Natural control of purple scale was not comparable with that obtained with insecticides. Natural control of rust and red mites was only comparable to chemical control during periods of high fungus density. With the 6-spotted mite natural control was usually adequate after warm winters but not after cold winters.—Univ. Fla Citrus Exp. Stat., Lake Alfred.

2102. Samson, J. A.
De kosten van mierenbestrijding in een citrus-aanplant. (**The cost of ant control in a citrus grove.**) [English summary 7 lines.]
Surinaam. Landb., 1955, **3**: 361-2.

The cost of spraying the trunks of citrus trees with 0·1% chlordane, using a power-sprayer, was about 17 guilders per ha. When a portable mist blower was first used, the total cost was about 4½ guilders, but the coverage obtained was not sufficient. When sufficient coverage was obtained with the mist blower costs were reduced to 60% of those with the motor-sprayer. When the mist-blower was adjusted to give an adequate coverage the saving effected compared with the power-sprayer was 60%.

2103. Abbas, H. M., Khan, M. S., and Haque, H.
Black fly of citrus (*Aleurocanthus woglumi* Ashby) in Sind and its control.
Agric. Pakistan, 1955, **6**: 5-23, bibl. 18, illus.

Aleurocanthus woglumi and its life history are described. Of 10 insecticides tested against it the following proved efficacious against all stages: 46·6% folidol at 10 liquid oz. per 100 gal., 23% systox at 12 liquid oz. per 100 gal., 50% malathion at 3 c.c. per gal., endrin (1·6 lb. endrin per U.S. gal. insecticide) at 3 c.c. per gal. and acrodel (1 lb. gamma BHC per gal. insecticide) at 0·1 gal. per 10 gal. water. It is recommended that spraying should take place in June/July after fruit set and again in November/December.

2104. Georghiou, G. P.
Preliminary instructions on control of Mediterranean fruit fly on Valencia oranges.
Countryman, Nicosia, January 1956, p. 17, illus.

Recommendations for the control of *Ceratitis capitata* on Valencia oranges are made in the light of experiments carried out in 1955. Bait sprays of malathion plus sugar should be applied to some 2 sq. ft. of the foliage on the southern side of each tree at the rate of 10 okes [1 oke=1·278 l.] of spray per 150 trees every 12 days from the onset of attack to harvesting, an extra application being made after heavy rain.

2105. Puzzi, D., Andrade, A. C., and Camargo, J. C.
Experiência de contrôle à mosca das frutas em 1955. **(Experiment on the control of fruit fly in 1955.)**
Biológico, 1955, **21**: 185-8, bibl. 5.

Dieldrin, toxaphene, lindane and parathion emulsions were tested against *Ceratitis capitata* on heavily infested Pera orange trees, 4 applications containing 3% sugar being made between early May and mid-July at 4–5 l. per tree. The best results were given by 500 c.c. 18·5% dieldrin per 100 l. water and 1,000 c.c. 50% toxaphene per 100 l., namely, 19·61 and 21·67% attacked fruit, respectively, compared with 29·28% in the control.—Inst. Biol., São Paulo, Brazil.

2106. Di Martino, E.
Notizie sulla fetola degli agrumi e sulla relativa difesa. **(Notes on fetola of citrus and its control.)**
Reprinted from *Tec. agric.*, 1954, Nos. 5/6, pp. 5, illus.

Notes are given on the incidence of fetola, the disfiguring marks caused by *Empoasca decedens*, in different types of orange, on alternate hosts and on the control of this leafhopper. In experiments at Acireale in 1952 spraying with 2% slaked lime plus an adhesive gave good preventive control on oranges but was not suitable for mandarins which do not withstand the washing necessary for the removal of the lime. A single application of 250 g. technical DDT in 100 l. water gave effective curative control and had a residual effect lasting 4 months. Two proprietary DDT formulations also gave good results.—Staz. sper. Agrumic., Acireale.

2107. Di Martino, E.
Le produzioni teratologiche nei citrus. **(Abnormal growth phenomena in citrus.)**
Reprinted from *Sicilia agric. for.*, 1954, No. 2, pp. 67-71, illus.
L'acaro delle meraviglie (*Aceria sheldoni* Ewing) e i relativa mezzi di lotta. **(The citrus bud mite, *Aceria sheldoni*, and its control.)**
Riv. Agrumic., 1956, **1**: 119-28, illus.

Illustrated notes are given on malformations of the shoot, flower bud, fruitlet and fruit in citrus caused by *Aceria sheldoni*. In Sicily the mite prefers lemons. Sweet oranges are rarely touched but sour oranges are attacked, especially in the nursery.

The second paper gives notes on the morphology and biology of the bud mite and on the injury it causes, and presents the results of control experiments on lemon made in 1953/54 with 9 acaricides. Recommended treatments are: (1) Spray with white oil at 2% when the trees are completely dormant after the autumn growth period or, if forcing is practised, at 1·75% immediately after the summer drought. (2) Spray with chlorobenzilate 25 at 0·29% at the beginning of the spring flush or, if forcing is practised, at the beginning of the autumn flush. (3) Aramite plus ovotran will control simultaneous attacks by *Aceria sheldoni* and *Tetranychus telarius*; chlorobenzilate has not yet been tested for the summer control of the latter. (4) Treatments should be applied in 2–3 consecutive years.

2108. Pratt, R. M.
The purple mite and six-spotted mite situation in 1955.
Citrus Mag., 1956, **18**(5): 12-13, 28-30, bibl. 4.

In 1955 a severe infestation of 6-spotted mite (*Eotetranychus sexmaculatus*) followed a cold December. Observations have shown that for a severe outbreak of purple mite (*Metatetranychus citri*) to occur, there must be a cold December with a dry winter and spring.

2109. Jeppson, L. R., Jesser, M. J., and Complin, J. O.
Control of mites on citrus with chlorobenzilate.
J. econ. Ent., 1955, **48**: 375-7, bibl. 5.

Chlorobenzilate was evaluated for its acaricidal properties in commercial citrus orchards [see also *H.A.*, 25: 4308]. Dosages of 4–8 oz. of actual chlorobenzilate/100 gal. of spray generally gave more effective control of citrus bud mite (*Aceria sheldoni*) than the standard treatment of petroleum oil. The addition of polyglycol did not increase the effectiveness of wettable powder formulations. At equivalent amounts of actual toxicant per unit of application chlorobenzilate was less effective than Ovotran or standard petroleum oil for the control of citrus red mite (*Metatetranychus citri*). In preliminary field trials chlorobenzilate was almost as effective as Aramite and Ovotran for control of yuma mite (*Eotetranychus yumensis*), and also showed promise in rust mite (*Phyllocoptruta oleivora*) control. May application of chlorobenzilate dust at 2·5 lb. per acre gave effective seasonal control of citrus flat mite (*Brevipalpus lewisi*).—Univ. Calif. Citrus Exp. Stat., Riverside.

2110. Gunther, F. A., Jeppson, L. R., and Wacker, G. B.
Persistence of chlorobenzilate residues in mature lemon fruits.
J. econ. Ent., 1955, **48**: 372-4, bibl. 5.
It was shown by chemical and biological methods of assay that chlorobenzilate has a half-life of 60–80 days under field conditions on and in the peel of sprayed lemons. There was little penetration into the flesh of sprayed fruits.—Univ. Calif., Riverside.

2111. Ewart, W. H., Jeppson, L. R., and Eaks, I. L.
Effect of chlorobenzilate sprays on the flavor and quality of lemons and oranges.
Citrus Leaves, 1955, **35**(11): 10-11, bibl. 1.
Chlorobenzilate sprays. Effect on flavor and quality of oranges and lemons.
Calif. Citrogr., 1955, **41**: 66, bibl. 1.
In tests on Navel and Valencia oranges and on lemons the acaricide chlorobenzilate (ethyl p, p′-dichlorobenzilate) did not significantly affect flavour, quality or maturity.—Univ. Calif., Riverside.

2112. DuCharme, E. P.
Sub-soil drainage as a factor in the spread of the burrowing nematode.
Citrus Ind., 1956, **37**(2): 20-1, bibl. 2.
In soil studies it has been shown that the burrowing nematode (*Radopholus similis*) moves about easily in the sandy soil of Florida citrus groves. Moist soil is necessary for migration, and nematodes move about most readily during and just after the rainy season. These nematodes can survive in water and moist soil for 2 or 3 months without food.—Fla Citrus Exp. Stat., Lake Alfred.

2113. Suit, R. F., DuCharme, E. P., and Brooks, T. L.
Effectiveness of the pull and treat method for controlling the burrowing nematode on citrus.
Citrus Ind., 1956, **37**(2): 9-10, 23, bibl. 4.
On the basis of experimental experience obtained in 7 groves infested with *Radopholus similis*, practical suggestions are made for reducing its spread.—Fla Citrus exp. Stat., Lake Alfred.

2114. Suit, R. F., and Brooks, T. L.
Progress report on treating citrus trees in place to control burrowing nematode.
Citrus Ind., 1956, **37**(1): 5-6, 11, bibl. 2.
Results of tests with nematocides for the treatment of citrus trees *in situ*, to control burrowing nematodes (*Radopholus similis*), were not promising. Non-phytotoxic concentrations of Vapam were not nematocidal. Although Nemagon did give control when used at 10 gal. per acre in a row treatment, reinfestation occurred within 18 months. Effective control of the burrowing nematode was also not obtained with the non-phytotoxic VC-13.

2115. (Sokoloff, B., and others.)
Citrus disease cure?
Citrus Mag., 1956, **18**(5): 11.
In a preliminary report on experimental work with hydrogenated fish oil, it is stated that soil applications will kill *Radopholus similis*. Complete kill was obtained with 1 application.—Bio-Res. Lab. and Citrus Dep. Fla south. Coll.

2116. Dean, H. A.
Factors affecting biological control of scale insects on Texas citrus.
J. econ. Ent., 1955, **48**: 444-7, bibl. 8.
Climatic factors are of particular importance in their effect on certain predator-prey relationships. Conditions favouring the development of certain scale insects and adversely affecting parasite development were found to be lack of ant control, location of trees next to dusty roads and drift of insecticides from treated row crops.

2117. Smirnoff, —.
Badigeonnage des troncs en tant que moyen de lutte contre certaines cochenilles, parasites des citrus. **(Painting the trunks as a means of controlling certain citrus scales.)**
Terre maroc., 1955, **29**: 432-3.
Recommendations are made, in the light of recent experiments, for the control of diaspid scales (*Lepidosaphes* spp. and *Parlatoria camelliae*) and mealybugs (*Pseudococcus* spp.) by trunk-painting in addition to spraying and fumigation. Against diaspids treatment should be applied in the first half of September and again, if necessary, in winter after harvest, and the mixture should consist of 3% white oil emulsion plus phosphoric ester at 25–30 g. active ingredient per 100 l. water. Against *Pseudococcus* treatment should be applied as soon as infestation is observed, and the mixture should consist of 3% white oil emulsion plus phosphoric ester at 30–40 g. active ingredient per 100 l. for adult trees and 2·0–2·5% and 20–25 g. respectively for young trees. On adult trees the trunk should be painted up to the fork. On young trees green bark should not be painted.

2118. Long, W. T., Reitz, H. J., and Thompson, W. L.
Timing of oil and parathion sprays for purple scale control in the southern Indian River Area.
Citrus Ind., 1956, **37**(2): 11-15, 22, bibl. 3.
Further information has been obtained in comparative trials with parathion and oil emulsion. Parathion-sprayed trees had lower populations of purple scale [*Lepidosaphes beckii*] and fewer mealybugs [*Pseudococcus* spp.] than oil-sprayed trees. Parathion-sprayed trees had denser foliage and less dead wood than oil-sprayed trees and yielded 23% more fruit. Sprays applied in the dormant or post-bloom stage were of more value than those applied during the summer months.—Fla Citrus Exp. Stat., Lake Alfred. [For earlier trials see *H.A.*, 23: 1169.]

2119. Botham, J. R.
Citrus red scale—a warning.
J. Dep. Agric. S. Aust., 1955, **59**: 203-5, illus.
New infestations of red scale (*Aonidiella aurantii*) have occurred in the Upper Murray citrus areas and warrant the most drastic eradicant treatment. Where only a few trees are involved pollarding or skeletonizing and removal and destruction of all foliage, fruit and twigs are recommended, followed by spraying the whole tree and the collar region with 1 in 30 white oil and painting

the trunk and limbs with lime whitewash. Where whole orchards are infested the trees should be pruned and then sprayed in December/January with 1 in 40 white oil followed by fumigation with HCN within a fortnight.

2120. Edwards, B. A. B., and Shedley, D. G.
White wax scale (*Ceroplastes destructor* Newstead). The evaluation of control methods, the use of organic insecticides and scale distribution on citrus trees in Western Australia.
J. Agric. W. Aust., 1955, **4**: 549-59, bibl. 5, illus.

In spray trials it was shown that the best control of white wax scale was obtained by a white oil-soda spray at the late peak stage or by the application of 2 white oil sprays 2 and 4 weeks after the main period of larval emergence. Timing and thoroughness of the spray applications were most important factors in obtaining good results. In a survey of scale population intensity the west side of the trees was found to be least heavily infected and the population tended to concentrate on the upper parts of the trees. Sprays of 0·5% chlordane, aldrin or dieldrin applied a fortnight after the main larval emergence did not give satisfactory control.

Citrus—fruit packing, storage and composition.

(*See also* 1919, 2148w.)

2121. Harris, W. H.
Preparing oranges for market.
Fruit World, Melbourne, 1955, **56**(12): 35, 37, illus.

Mention is included of a gauge for adjusting independent section fruit sizing machines developed by the Department of Agriculture in conjunction with one of the manufacturers. It can be used for all types of fruit and calibrated to the standardized list of counts instead of to fruit size.

2122. Eaks, I. L.
Hydrocooling effect on oranges.
Calif. Citrogr., 1955, **41**: 68-70.
Effect of hydrocooling on oranges.
Citrus Leaves, 1956, **36**(2): 9, 33.

The effect of hydrocooling on physiology and quality was studied. Mechanical handling through the hydrocooling unit, using water at room temperature, had little or no effect on the fruit. In hydrocooling the water temperature was 34° F., and fruit temperature was lowered by 20–25° F. in 17 minutes. Respiration rate was increased by about 30% by hydrocooling. Hydrocooled fruits were also more susceptible to decay and were softer than non-cooled fruits. Air pre-cooling caused a slight, but insignificant, respiratory stimulus.

2123. Smith, R. J., and Perry, R. L.
Cooling oranges by air before packing.
Calif. Citrogr., 1956, **41**: 102-7, bibl. 5, illus.

For air-cooling oranges ready for packing are placed in bins with 2 perforated or mesh sides, and cold air is forced through. Plant layout plans are discussed and illustrated, and the economic advantages of air-cooling are enumerated.—Univ. Calif., Los Angeles.

2124. (Turrell, F. M.)
Temperature capacity of citrus fruits.
Citrus Leaves, 1955, **35**(11): 16.

A method of determining the heat-storage capacity of citrus fruits has been worked out at the University of California. Using this method the heat-storage capacity of Riverside-grown citrus was about 11–16% that of water. A method for measuring the heat conductivity coefficient of citrus fruits is also described.

2125. Samson, J. A.
De invloed van verschillende factoren op het bederf van citrusvruchten. **(The influence of various factors on decay of citrus fruits.)** [English summary ¼ p.]
Surinaam. Landb., 1955, **3**: 306-12, bibl. 4.

Experiments were carried out in Dutch Guiana between 1950 and 1954 on storage of oranges and lemons. *Diplodia natalensis* was shown to be the chief cause of fruit rot. During the first few weeks of storage a considerable percentage of brown rot (*Phytophthora palmivora*) sometimes occurred. Potash application to sandy soils reduced decay in fruits during storage. Calyx removal, and to a lesser extent pulling (instead of clipping) the fruit at harvest, reduced stem-end rot. Decay was almost completely prevented for at least 4 weeks by storage at 7° C. with a relative humidity of 84%. Stem-end rot was controlled by treatment with a solution of 2% Dowicide A, 1% hexamine and 0·4% caustic soda for 3 minutes at 37° C.

2126. Barakat, M. Z., Shehab, S. K., and El-Sadr, M. M.
A new titrimetric method for the determination of ascorbic acid.
Analyst, 1955, **80**: 828-33, bibl. 21.

The new method, which involves the use of sodium 1 : 2-naphthoquinone-4-sulphonate as oxidizing agent, has been successfully applied to citrus fruits.—Ibrahim Pasha El-Kebir Univ., Cairo.

2127. Axelrod, B., Jang, R., and Lawrence, J. M.
Glutamic acid decarboxylase of lemons and oranges.
J. agric. Food Chem., 1955, **3**: 1039-41, bibl. 13.

The extraction and purification of glutamic acid decarboxylase from the flavedo of Navel and Valencia oranges and Eureka lemons is described.—Agric. Res. Serv., U.S.D.A., Albany, Calif., and Dep. agric. Chem., Wash. St. Coll., Pullman.

Dates.

2128. Bhagwat, R. V., and Sohonie, K.
Isoniazide-like substance in *neera* from date palm (*Phoenix sylvestris*).
Sci. and Cult., 1955, **21**: 265-6, bibl. 9.

Paper chromatographical analysis of *neera*, the tapped juice of *Phoenix sylvestris*, revealed the presence of nicotinic acid and a number of related substances. Of these, isonicotinic acid hydrazide (isoniazide) does not appear previously to have been found in natural materials.—Dep. Biochem., Inst. Sci., Bombay.

Litchis.

(*See also* 2148s.)

2129. NAKATA, S.
Lychee flowering and girdling.
Hawaii Fm Sci., 1956, **4**(3): 4-5, illus.

Experiments begun in 1950 have led to the following conclusions: (1) Girdling by running a pruning saw round the branch or trunk greatly increases flowering and fruiting in some varieties, but not in others. (2) September is probably the best month for treatment. (3) Girdling is ineffective if a tree has failed to produce a growth flush 6 months before the floral initiation period or is in poor condition. (4) In windy situations girdling may result in dieback. (5) In dry areas girdling in alternate years or of half the tree each year is preferable to complete, annual girdling. Trees to be girdled should receive a complete fertilizer in July after harvesting and copious irrigation for the next 3–4 weeks to induce flushing, and are then girdled in September when the leaves have reached full development.

2130. NISHIDA, T., AND HOLDAWAY, F. G.
The erinose mite of lychee.
Circ. Hawaii agric. Exp. Stat. **48**, 1955, pp. 10, bibl. 7, illus.

The erinose mite (*Aceria litchii*), one of the most important pests of the litchi (*Litchii chinensis*) in Hawaii, can be effectively controlled by applying 5 lb. wettable sulphur per 100 gal. water at the start of a new growth flush, followed, if necessary, by 2 or 3 additional treatments at monthly intervals.

2131. THOMPSON, B. D.
Effects of prepackaging and refrigeration on quality of lychees.
A.R. Fla agric. Exp. Stats, 1954, p. 113.

Water-precooled and non-precooled litchis prepackaged in ventilated polyethylene bags were stored at 40°, 55° and 70° F. Weight losses in all treatments were less than 5%. Fruits stored for 9 days at 40° F. were rated as having a satisfactory appearance. No decay developed at 40°, it was slight after 6–9 days at 55°, and moderately severe after 3 days at 70°. Precooled fruits appeared to be firmer after storage than non-precooled fruits. Satisfactory flavour was maintained in all treatments. Chlorine at rates up to 2,500 p.p.m. did not cause discoloration. Litchis packaged in clusters abscissed after 2 days at 70° or 4–6 days at 40°. Single fruits were firmer than those packaged in clusters.

Olives.

(*See also* 1292, 1699, 1954r, 2148c, d, h, v, 2306h.)

2132. BALDINI, E., AND SCARAMUZZI, F.
Ulteriori indagini sulla validità del metodo biostatistico nella descrizione e classificazione delle cultivar di olivo. (**Further investigations on the validity of the bio-statistical method of describing and classifying olive varieties.**) [English summary 6 lines.]
Ann. Sper. agrar., 1956, **10**: 171-86, bibl. 89.

Five years' biometrical investigations on 36 Tuscan olive varieties confirmed earlier unfavourable conclusions regarding the bio-statistical methods hitherto proposed.—Ist. Colt. arbor. Univ. Firenze.

2133. SCARAMUZZI, F., AND CANCELLIERI, M. B.
Contributo allo studio delle razze d'olivo coltivate in Toscana. Indagini condotte in Provincia di Livorno e nella media valle del Cecina. Parte IV. (**Contribution to the study of the olive varieties grown in Tuscany. Investigations made in the province of Leghorn and in the middle Cecina valley. Part IV.**) [English summary 7 lines.]
Ann. Sper. agrar., 1955, Vol. **9**, No. 6, Suppl. pp. I-XXV, bibl. 51, illus.

Information is given on the morphological, biological and agronomic characters of 9 varieties.—Ist. Colt. arb. Univ. Firenze. [For earlier parts see *H.A.*, 25: 4329 and 26: 1068t.]

2134. CASTORINA, S.
Le varietà d'olivo coltivate in Abruzzo. (**The olive varieties cultivated in Abruzzo.**) [English summaries 12 and 11 lines.]
Ann. Sper. agrar., 1955, Vol. **9**, No. 6, Suppl. pp. XXXV-LXIII, illus., and 1956, Vol. **10**, No. 1, Suppl. pp. I-XXVII, bibl. 13, illus.

Information is given on the soils, climate and methods of olive growing in Abruzzi, and on the morphological, biological and agronomic characters of the 22 varieties cultivated in the area.—Staz. sper. Oliv. Oleific. Pescara.

2135. ORTEGO NIETO, J. M.
Las variedades de olivo cultivadas en España. (**The varieties of olive cultivated in Spain.**)
[*Publ.*] *Inst. Invest. agron. Madrid*, 1955, pp. 75, bibl. 8, illus.

The director of the Estacion de Olivicultura, Jaen, gives brief notes on 24 varieties under the following headings: origin, distribution, tree characters including vigour and habit, leaf, drupe, stone and agronomic characters.

2136. ANAGNOSTOPOULOS, P. T.
The unfruitfulness of some varieties of olive in 1955. [Greek.]
Tachydromos, 29 October 1955, p. 1.

A study of temperatures in Athens in relation to the fruiting of olives shows that the buds require low temperatures (several degrees of frost in some varieties) in December/January and both buds and kernels, high temperatures in July/August. The chilling requirements of some varieties are listed.

2137. BOUAT, A., RENAUD, P., AND DULAC, J.
Étude sur la physiologie de l'olivier. (Quatrième mémoire.) Gelée et diagnostic foliaire. (**Study on the physiology of the olive tree. (Fourth report.) Frost and leaf analysis.**)
Ann. agron., 1955, **6**: 635-50, bibl. 12, illus.

Leaf analysis showed that over-cropping leads to a considerable reduction in the mineral reserves of the olive tree and renders it liable to frost injury. After a winter in which frost injury has occurred high-yielding trees should receive more severe pruning than low-yielding trees, and frost-injured trees should be more severely pruned than a superficial examination at the time of injury would suggest. Adequate manuring to give a good yield and to permit the storage of

sufficient mineral reserves is the best protection against frost injury. [For third report see *H.A.*, 25: 2083.]

2138. Ciferri, R., and others.
La leptonecrosi da borocarenza dell'olivo. Parte I. **(Olive phloem necrosis due to boron deficiency. Part I.)** [English summary ¼ p.]
Ann. Sper. agrar., 1955, **9**: 1309-42, illus.
The susceptible varieties include Frantoio and Leccino. The disorder affects trees of all ages, developing rapidly in young trees and more or less slowly in adult trees in which the symptoms may wax and wane. The symptoms are progressive defoliation and dieback of a part of the crown, witches' brooms, partial chlorosis generally of the apical half of the leaf, corky spots on the trunk and branches and necrosis of the bark, cambium and wood.—Lab. crittogam. ita'., Pavia. [See also *H.A.*, 25: 2085.]

2139. Ciferri, R., and others.
La leptonecrosi da borocarenza dell'olivo. Parte II. **(Olive phloem necrosis due to boron deficiency. Part II.)** [English summary 11 lines.]
Ann. Sper. agrar., 1956, **10**: 25-59, bibl. 1, illus.
A series of experiments over 3 years with manure and several fertilizers including boric acid and sodium borate established boron deficiency as the cause of leptonecrosis. In one experiment the application of 26 and 42 g. sodium borate to young and old trees respectively in March caused the disappearance of symptoms and better growth in the former and improved growth and yield in the latter by October.—Lab. crittogam. ital., Pavia.

2140. Russo, G.
Riassunto circa i reperti bio-ecologici sul *Dacus oleae* e risultati della sperimentazione antidacica nella zona di Ascea (Salerno) nel 1954. **(Summary of bio-ecological investigations on *Dacus oleae* and the results of control experiments in the Ascea (Salerno) district in 1954.)**
Not. Mal. Piante, 1956, No. 34, pp. 35-9.
Tests were made on poison baits and on various spray materials used alone or in mixtures or with added copper. The best results were obtained with 0·1% emulsifiable parathion applied 1–3 times according to locality, but concentrations of 0·075 and 0·05% also gave good results. The addition of copper sulphate or copper oxychloride activated the parathion; in 2 examples quoted 3 applications of 0·05% parathion gave 97·5% clean fruit when applied in mixture with copper sulphate at 0·5% and 91% when mixed with 16% copper oxychloride at 1·0%.—Ist. e Lab. Ent. agrar. F. Silvestri, Portici.

2141. Lamouria, L. H., and Hartmann, H. T.
Machine harvesting of olives.
Calif. Agric., 1955, **9**(12): 8, 13, illus.
An average of 94·6% of the crop of Mission olive trees was removed by a machine consisting of a boom-type shaker and catching frame. With mechanical harvesting the time required to remove a 35-lb. lug box of fruit was 0·40 man-hour compared with 0·75 man-hour for conventional picking. When the machine-harvested olives were processed by the black-ripe method visible defects were negligible, but with the Spanish-green method of processing so much bruising was in evidence that up to 30% of the fruit was unmarketable. This bruising was, however, reduced by half by putting the fruit in brine immediately after harvesting.—Univ. Calif., Davis.

Passion fruit.

2142. Buell, E. P.
Training and pruning the passion vine.
Trop. Agriculturist, 1955, **111**: 18-27, bibl. 10, illus.
In experiments at Peradeniya on the local golden-fruited passion vine (*P. edulis*) grown on the vertical double-cordon system on trellises with wires at 3, 5 and 7 feet from the ground, significantly higher yields were given by (1) pruning compared with no pruning, and (2) 2-node pruning of foundation spurs (tertiaries that normally give rise to flowers) compared with more drastic and less drastic pruning.

2143. Otagaki, K. K.
Passion fruit rind as a feed.
Hawaii Fm Sci., 1956, **4**(3): 8, illus.
The dehydrated rind (chemical analysis given) and the ensiled product have given satisfactory results in preliminary feeding tests on dairy cattle and pigs.

Persimmons.

(*See also* 1699.)

2144. Baldini, E., and Scaramuzzi, F.
Contributo ad una indagine pomologica sulle cultivar di diospiro. Parte I. **(A contribution to pomological research on persimmon varieties. Part I.)** [English summary 7 lines.]
Ann. Sper. agrar., 1956, Vol. **10**, No. 1, Suppl. pp. xli-lxviii, illus.
Notes are given on the origin, distribution and botany of *Diospyros kaki*, together with detailed descriptions of 9 of the varieties in the collection at the Florence Institute.—Ist. Colt. arbor. Univ. Firenze.

Tung.

(*See also* 1954s, 2148i.)

2145. Dickey, R. D., and Blackmon, G. H.
Tung production.
A.R. Fla agric. Exp. Stats, 1954, p. 100.
Application of 1½ and 3 lb. of elemental N to 10-year-old tung trees growing in a fine sandy loam did not increase the incidence of Zn deficiency. Trees receiving high N and low K_2O treatment showed more K deficiency than those receiving low N and low K_2O, or low N and high K_2O treatments.

2146. Lagasse, F. S., and others.
U.S. field laboratory for tung investigations.
A.R. Fla agric. Exp. Stats, 1954, pp. 113-16.
A number of mature *Aleurites fordii* trees which appeared to be resistant to low temperatures just before and during flowering have been selected for progeny testing. A direct, rapid method of Zn determination by means of the polarograph has been worked out. *Nutritional studies.* In experiments on nitrogen sources, and levels

and ratios of K and Zn, lowest fruit yields were obtained from trees receiving the NH_3, low K, high Zn treatment; the lowest oil percentages in the fruit occurred under conditions of high Zn and low K in either sand or soil. Little difference was found in oxalic acid content of leaves of trees grown in sand and in soil, but total organic acids were higher in leaves of soil-grown trees. Higher N levels significantly increased leaf N and increased average annual yields: higher K levels significantly increased average oil contents. Several sources of magnesium were applied to tung trees, and all increased leaf Mg content. Calcium was shown to be important in obtaining satisfactory yields, particularly when N was supplied as nitrate. In trials with 3 levels each of N, K and Mg, the trees have only responded to N; source of N had little or no influence on growth or yield of trees.

2147. CHAKRABARTY, S. R., AND CHAKRABARTY, M. M.
The composition of Indian tung oils.
Sci. and Cult., 1955, **21**: 326-7, bibl. 7.
Physical and chemical data are given on the oils of *Aleurites montana* and *A. fordii*.—Univ. Coll. Technol., Calcutta.

Noted.

2148.

a ANAGNOSTOPOULOS, P. T.
L'agrumiculture en Grèce. (**Citrus growing in Greece.**)
Fruits et Prim., 1955, **25**: 460-71, illus.

b ANON.
The lime and lime oil industry of Dominica.
Windward Islands Annu., 1955, pp. 45-8.

c ANON.
La olivicultura y la industria del aceite en Italia. (**Olive growing and the olive oil industry in Italy.**)
Hoy en Ital., 1955, No. 17, pp. 951-8, reprinted in *Bol. Oleic. int.*, 1955, **5**(28): 29-41.
Acreages, yields and labour force.

d DE AZEVEDO, A. R., AND SILVA, G. DE M.
Trabalhos realizados na Estação agronómica nacional, no ano de 1954, sobre a biologia da mosca da azeitona e respectivos meios de luta. (**Research at the National Agronomic Station in 1954 on the biology and control of the olive fly.**)
Bol. Junta nac. Azeite, 1955, **10**(37): 27-56, from abstr. in *Oléagineux*, 1956, Vol. **11**, No. 121.
Dacus oleae, its biology, distribution and control in Portugal.

e BEUTEL, J. A.
Increased production and profits by top-working.
Yearb. Calif. Avoc. Soc. for 1955, pp. 107-10.
Instructions for topworking avocadoes. [See also abstract 2063.]

f BURKE, J. H.
Mediterranean citrus crop outlook for the 1955-56 crop season.
Foreign Agric. Circ. **FCF 5-55**, 1955, pp. 8.
Observations on the Swiss citrus market. October, 1955.
Foreign Agric. Circ. **FCF 6-55**, 1955, pp. 5.

g CUENOT, G.
Notes sur la production des agrumes au Maroc. (**Notes on citrus production in Morocco.**)
Fruits et Prim., 1955, **25**: 449-51.
Production, exports, internal consumption and number of bearing trees.

h DEMAY, J.
Amélioration de la technique d'extraction de l'huile d'olive par un procédé Acapulco perfectionné. (**Improved olive oil extraction by a modified Acapulco process.**)
Oléagineux, 1956, **11**: 95-102, illus.
A new extractor described.

i DROSDOFF, M.
Effect of soil type and fertilizer treatment on minor element nutrition of tung trees.
Proc. Soil Sci. Soc. Fla, 1954, **14**: 37-46, bibl. 23.

j EVREINOFF, V. A.
Étude pomologique sur le Feijoa. (**Pomological study of the feijoa.**)
J. Agric. trop. Bot. appl., 1955, **2**: 323-9, bibl. 15, and *Arboric. fruit.*, 1955, No. 22, pp. 7-9, bibl. 9.
Origin, biology, requirements, culture and varieties.

k FLETCHER, W. A.
Citrus pests and diseases in New Zealand.
Bull. N.Z. Dep. Agric. **20**, 1955, pp. 27, illus.
Identification and control.

l GONZALEZ MELO, J.
L'agrumiculture espagnole. (**Citrus growing in Spain.**)
Fruits et Prim., 1955, **25**: 440-8, bibl. 5, illus.

m MICHAELIDES, R. C.
Quelques aspects de l'exploitation agrumicole à Chypre. (**Some aspects of citrus growing in Cyprus.**)
Fruits et Prim., 1955, **25**: 475-9.

n MILLER, W. W.
The macadamia nut—a new commercial crop for California.
Yearb. Calif. Avoc. Soc. for 1955, pp. 143-5.

o DE OLIVEIRA, W.
Brèves notes sur l'agrumiculture au Portugal. (**Brief notes on citrus growing in Portugal.**)
Fruits et Prim., 1955, **25**: 452-9, illus.

p PANARETOS, A.
L'agrumiculture à Chypre. (**Citrus growing in Cyprus.**)
Fruits et Prim., 1955, **25**: 472-4.

q RUSSO, F.
Manifestazioni di foliocellosi o mottle leaf degli agrumi in Sicilia. (**Foliocellosis or mottle-leaf of citrus in Sicily.**) [English summary ½ p.]
Ann. Sper. agrar., 1955, **9**: 1289-1307, bibl. 73, illus.
Zinc deficiency; for shorter versions see *H.A.*, 25: 4290 and 26: 1004.

r RUSSO, F.
Promettenti varietà di agrumi recentemente introdotte dalla California in Italia. (**Promising citrus varieties recently introduced into Italy from California.**)
Introduzione presso la Stazione Sperimentale di Agrumicoltura di Acireale di specie, varietà e ibridi di agrumi e specie affini in gran parte inesistenti presso le collezioni italiane. (**Introduction to the Acireale Citrus Experimental Station of species, varieties and hybrids of citrus and related genera largely absent from Italian collections.**)
Riv. Agrumic., 1956, **1**: 113-18 and 133-8.
A wide range of species and varieties.

s SUIT, R. F., AND DUCHARME, E. P.
Immunity of the lychee to the burrowing nematode.
Citrus Ind., 1956, **37**(1): 12-13.
It is not attacked by *Radopholus similis*.

t U.S. DEP. AGRIC., FOREIGN AGRICULTURAL SERVICE.
1955-56 world citrus production higher.
Foreign Agric. Circ. **FCF 1-56**, 1956, pp. 6.
Data for specific countries.

u VARELA MARTINEZ, R.
La producción de naranjas en el mundo y en Colombia. (**World production and Colombian production of oranges.**)
Agric. trop. Bogotá, 1955, **11**: 919-20.

v VENEZIA, M., AND PAPADANTONAKIS, S.
Contributo alla ricerca sulla tossicità del parathion nell'olio di olive. (**Contribution to research on the toxicity of parathion in olive oil.**)
Not. Mal. Piante, 1956, No. 34, pp. 43-9, bibl. 7.
Toxicity tests on animals.

w WINSTON, J. R.
The coloring or degreening of mature citrus fruits with ethylene.
Circ. U.S. Dep. Agric. **961**, revised 1955, pp. 13, illus.

x YOUNG, T. W.
Soil moisture relations in the coastal citrus areas of Florida.
Bull. Fla agric. Exp. Stats **526**, 1953, pp. 38 + appendix, bibl. 19, illus.

y ZENTMYER, G. A., HALMA, F. F., AND WILHELM, S.
Relative susceptibility of Guatemalan and Mexican avocado rootstocks to *Verticillium* wilt.
Phytopathology, 1955, **45**: 635-6, bibl. 3.
See *H.A.*, 24: 4175.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 1656, 1657, 2305o, 2306e, f, n, 2310, 2328, 2331, 2332, 2340i.)

2149. HERKLOTS, G. A. C.
The Imperial College of Tropical Agriculture.
New Commonw., 1955, Vol. **30**, No. 11, Suppl. pp. XV-XVII.
Information is given on the history of the College, on plans for amalgamating the banana, cocoa and soils research schemes into a Regional Research Centre, which would ultimately undertake other branches of long-term research, and on finances and sugar research.

2150. THISTLE, A.
Agricultural crops in Hawaii. I.
World Crops, 1956, **8**: 63-6, 77, illus.
The chief crops are sugar cane (240,000 acres), pineapples (73,000), coffee (4,000), tree fruits (2,000) and macadamia nuts (1,750). A short note on the climate is followed by a general account of the sugar cane industry under the following headings: research, cropping and yields, land preparation and planting, fertilizers, irrigation, cultivation and weed control, pest and disease control, harvesting, ratooning, transportation, milling, marketing and by-products.

2151. MILLER, R. W. R.
The work of the Sarawak Department of Agriculture.
World Crops, 1956, **8**: 53-8, bibl. 3, illus.
The crops dealt with include rubber, pepper, coconuts, pineapples and other tropical fruits, coffee and tobacco.

2152. SMITH, R. M., AND ABRUÑA, F.
Soil and water conservation research in Puerto Rico, 1938 to 1947. [Spanish summary ⅔ p.]
Bull. P.R. agric. Exp. Stat. Rio Piedras **124**, 1955, pp. 51, bibl. 13, illus.
A detailed summary and interpretation are presented of 10 years of run-off and erosion research and related studies on 20 plots on clay soils near Mayagüez. Run-off and erosion measurements involved comparisons of different crops or crop sequences, mechanical practices, and mulching and bare fallowing soils, both natural and desurfaced. Plant-growth characteristics and yields were determined as a part of the plot studies. Sugar cane and coffee are among the crops for which data are given.

2153. DUN, G. S.
Economic entomology in Papua and New Guinea, 1948-1954.
Papua N. Guinea agric. J., 1955, **9**: 109-19, illus.

A review is given of the investigations in pest control carried out in the Territory by the Department of Agriculture in the postwar period, together with an indication of some of the more serious problems yet to be solved. The chief crops and pests discussed are: coconut (*Oryctes rhinoceros*, *Sexava* spp., *Promecotheca papuana*); cacao (stem borers, including *Pantorhytes plutus* and *Glenea aluensis*, and capsids, including *Parabryocoropsis* spp. and *Pseudodoniella pacifica*); horticultural crops (*Melanagromyza phaseoli*, cutworms and the giant African snail, *Achatina fulica hamillei*); and insect pests of stored products.

2154. Lamprey, H. F.
Control of game and vermin animals.
World Crops, 1956, **8**: 81-3, illus.

Information is given on the use of electric fencing against wild pigs, hyenas, baboons, antelopes, buffaloes, rhinoceros, elephants and giraffes.—Game Dept., Kondoa Irangi, Tanganyika.

2155. Nolen, C. P., and Wijbrans, J. R.
Bestrijding van apenplagen. (**Control of monkeys.**) [English and Indonesian summaries ¼ p. each.]
Bergcultures, 1955, **24**: 533-41, illus.

Monkeys have become a pest on oil palm estates in Sumatra where they damage the inflorescences and leaves of mature palms and destroy young palms. Two types of trap, used successfully for their control, are described.—Algemeen Proefstat. AVROS, Medan.

Bananas.

(*See also* 1376, 1607, 2305h, p, 2306a, j.)

2156. Anon.
Can bananas grow in Cyprus?
Countryman, Nicosia, December 1955, p. 7, illus.

Bananas grow well in the Paphos district. Planting began on a small scale in 1952, and in 1954 the gross return was £100 per donum [1 donum=1,600 sq. yd.].

2157. Cann, H. J.
Split corm.
Agric. Gaz. N.S.W., 1955, **66**: 539-42, bibl. 1, illus.

Split corm in the Cavendish and Williams banana varieties, probably caused by excessive uptake of mineral salts, has become more common in certain districts in recent years. It is characterized by a splitting of the base of pseudostem, the splits either being confined to the outer layers or extending to the centre. Affected plants produce little or no fruit. Growers are advised to cut down affected plants and allow any spear point suckers to grow on. The association of heavy fertilizing with the abnormality seems sufficiently clear to suggest that in years of recurring droughts the fertilizing rate could be profitably reduced.

2158. Stover, R. H.
Flood-fallowing for eradication of *Fusarium oxysporum* f. *cubense*: III. Effect of oxygen on fungus survival.
Soil Sci., 1955, **80**: 397-412, bibl. 15, illus.

In soil 25% saturated with water *Fusarium oxysporum* f. *cubense* survived 152–180 days in an anaerobic jar. Under similar conditions in saturated soil the fungus survived about 81 days. On return to aerobic conditions, *Fusarium* multiplied in the soil. Multiplication was more rapid in sterile soil than in non-sterile soil, in loam than in sandy loam, and in dry (15–25% saturated) than in moist (35–85% saturated) soil. Peptone added to the water reduced *Fusarium* survival, as did a layer of mineral oil on the surface of the water. Rice culture had no measurable effect on the amount and length of *Fusarium* survival in submerged soil. It is concluded that fungus survival in submerged soil is determined by the amount of oxygen available to the surface oxidized soil layer. [From author's summary].—United Fruit Co., La Lima, Honduras. [For Parts I and II see *H.A.*, 24: 1017r and 4282.]

2159. Moity, M.
Un envoi de bananes Poyo sous gaine en polyéthylène. (**Shipment of Poyo bananas in polyethylene wraps.**)
Fruits d'Outre Mer, 1955, **10**: 515.

A consignment of Poyo bananas was shipped to France from the Ivory Coast with no protection other than a sheet of polyethylene wrapped round each stem and tied with string at both ends. The wrapper was perforated with 1 cm. holes 20 × 20 cm. apart for aeration. In the hold 3 layers of stems stowed horizontally were placed on 2 vertically stowed layers, with straw under the bottom one. The polyethylene-wrapped stems were railed from Nantes to Bordeaux and placed in a ripening store with samples from other differently packed consignments from the same ship. On inspection after 6 days' storage they were no more bruised than the other lots and showed no damaged or separated hands and no rubbing, defects from which the other lots were far from free. The method results in savings on the return charges on the padded wraps and on freight through a substantial reduction of hold space occupied per ton. It has, however, the important disadvantage that the fruit must be packed in cases for despatch to retailers, an operation for which most stores are not equippred.

2160. Anon.
Essais sur le transport en nu de bananes Poyo de Côte d'Ivoire. (**Experiments on the shipping of unpackaged Poyo bananas from the Ivory Coast.**)
Bull. Inst. Fruits Agrumes colon., Stat. rég. d'Azaquié (Côte d'Ivoire) **6**, 1955, pp. 11, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2797.

Poyo bananas were successfully transported in bulk without packaging from the Ivory Coast to France. Packing in lorries for transport to the ship, handling on the wharf and stowage need careful attention. The bananas were 0·5° to 1·0° C. cooler than packaged bananas on arrival at the ship, and were more rapidly cooled on board. Damage was mainly due to the rubbing of bananas against each other and against surrounding surfaces.

2161. Cadillat, R., Dève, F., and Cuillé, J.
À propos du transport par mer des bananes emballées. Le fruit "bouilli vert". (**On the transport by sea of packaged bananas. "Bouilli vert" fruit.**)
Rev. gén. Froid, 1954, **31**: 477-81, from abstr. in *Food Sci. Abstr.*, 1955, **27**, No. 2796.

A study was made of a cargo of bananas of which many showed the form of damage known as "bouilli vert", although they had been picked at the right stage of maturity, packaged as usual in straw and paper, and kept during the voyage in appropriate conditions of temperature, humidity, ventilation and atmospheric carbon dioxide. The damage was found where the packaging allowed the fruit to be compressed, and it is ascribed to a combination of bruising and asphyxia, leading to death of the tissues.

Cacao.

(*See also* 2305f, x, 2306c, t, x.)

2162. Cocoa, Chocolate and Confectionery Alliance.
Cocoa Conference 1955.
Cocoa Choc. Confect. Alliance, 11 Green Street, London, W.1, pp. 149, bibls., illus., 30s.

The papers and discussions published reflect advances in research and outlook since the previous Conference in 1953. In addition to papers on which separate abstracts will be found below, the following may be noted: "Soil conditions for cocoa and their amendment for maximum yield", by G. Havord; "Methods of propagation", by D. B. Murray; "Notes on disease and pest control and plans for the rehabilitation of the cocoa industry in the Gold Coast", by J. D. Broatch; "The development of fungicidal spraying in Nigeria against black pod disease in cocoa", by J. R. G. Hadland and H. W. Reeves; "Some recent concepts in cocoa research and their relation to a programme of basic research", by R. G. Fennah; and "The preparation of cocoa", by R. V. Wadsworth.

2163. West African Cocoa Research Institute (W.A.C.R.I.).
Annual Report West African Cocoa Research Institute, 1954/55, Tafo, 1955, pp. 110, 5s.

The following are the main headings and subheadings: *Virus research:* host range, transmission, classification, effect of host plant nutrition, chemical detection of infection, morbid histology of infected cacao, resistance and tolerance. *Mealybug studies:* movement, seasonal fluctuations, ant-mealybug relations, biological control. *Black pod disease:* spraying and harvesting trials, spore dispersal, cushion infection, utilization of damaged beans. *Capsid studies:* regeneration of damaged areas, control, population studies. *Establishment and maintenance:* establishment, spacing, yields of seedlings and rooted cuttings, soils, crop forecasting, chupons on cuttings. *Soil fertility and manurial requirements:* major and minor nutrients and their uptake, soil analyses and characters. *Root studies:* fungus-root associations, distribution. *Vegetative propagation. Plant breeding. Fermentation and quality:* effect of ripeness and storage of pods, fermentation, testing, bean size. *Insecticide studies:* effect on fruit setting and yield, systemics. *Arboricides. Cherelle wilt. Shade. Virus research at Ibadan substation.* The research programme is printed in full as an appendix.—[See also separate abstracts below.]

2164. Pickles, A.
The research policy and programme of the West African Cocoa Research Institute.
Rep. Cocoa Conf. Lond. 1955, Cocoa, Choc., Confect. Alliance, pp. 117-21.

This paper embodies a synopsis of the W.A.C.R.I. research programme. The main subjects of study are viruses, mealybugs, black pod disease, capsids, establishment and maintenance, soil fertility and manurial requirements, vegetative propagation, breeding and selection, fermentation and quality, pin-hole borers, insecticides and fungicides, the physiology of nutrition, of growth and of fruiting, and shade.

2165. Oechsli, L. P., and Boynton, D.
The American Cocoa Research Institute and the Inter-American Cacao Center.
Rep. Cocoa Conf. Lond. 1955, Cocoa, Choc., Confect. Alliance, pp. 124-9.

The American Cocoa Research Institute, which is backed by American cocoa merchants and chocolate manufacturers, sponsors the training of technicians, research and extension-education, with a view to increasing cacao production in Latin America. It encouraged the establishment of, and collaborates with, the Inter-American Cacao Center at Turrialba. Research conducted at the Center in 1953/55 covered vegetative propagation, clonal trials, pruning of mature seedling trees, cherelle wilt and flushing, soils and nutritional studies, *Phytophthora* pod rot, anthracnose (*Colletotrichum theobromicolum*), thread blight (*Pellicularia koleroga*), cushion gall, *Rosellinia* root rot ("*Morte subita*") and disease surveys in various countries.

2166. Richards, A. V.
Development of the cacao industry in Ceylon.
Trop. Agriculturist, 1955, **111**: 42-6.

Cacao research in Ceylon began to receive serious attention in 1953 with the appointment of a Cacao Research Committee. Notes are given on the following aspects of cacao growing in the island: exports, ecology, varieties, local selections and imported clones, manuring, pruning, underplanting marginal rubber, diseases and pests, and the organization of the Cacao Research Station at Kundasale.

2167. Cope, F. W., and Jolly, A. L.
West Indian clones.
Rep. Cocoa Conf. Lond. 1955, Cocoa, Choc., Confect. Alliance, pp. 58-66, bibl. 2.

The present-day position of knowledge in relation to the use of clonal cacao cuttings is reviewed, largely with reference to experimental results obtained in Trinidad and Grenada. Some recent results of experimentation on flavour characteristics in Trinidad clones are given. The conclusion reached is that traditional Trinidad flavour may not be found in the present series of clones, because these embrace only a portion of the variability of the Trinidad tree population. Whilst a small range of clones shows great yield promise in Trinidad and in Grenada on a range of soil types, the conclusion is reached that, for one reason or another, a much larger number of selections is required than is at present available. Some suggestions are put forward on research immediately required on clonal behaviour. —[From authors' summary.]

2168. Rogers, H. H.
New varieties of cocoa in West Africa.
Rep. Cocoa Conf. Lond. 1955, Cocoa, Choc., Confect. Alliance, pp. 76-9.

A distribution to the West African farmer of open-pollinated pods from 10 Upper Amazon types is now taking place. There are promising clones available for trial under different soil and climatic conditions prior to final approval for distribution. Within the next decade there should be available improved varieties for growing from seed. A method has been adopted in the Gold Coast for the rapid multiplication of new varieties. No one variety, either from seed or grown as a clone, can meet the needs of West Africa. The inherent dangers of a release of only a few varieties on a large scale should be borne in mind.—[Author's summary and conclusions.] [See also *H.A.*, 26: 1095.]

2169. Hammond, P. S.
Field experience in the Gold Coast with Upper Amazonian and other new varieties.
Rep. Cocoa Conf. Lond. 1955, Cocoa, Choc., Confect. Alliance, pp. 79-83.

The new varieties in the Gold Coast fall into two main groups: (a) Upper Amazonian varieties, and (b) local selections. More recently, however, cacao types resulting from crosses between these two groups have proved to be most promising. The multiplication of improved cacao has been undertaken since 1948 with the object of supplying farmers with (a) pods and seedlings of mixed, commercially approved, Upper Amazonian types, (b) clonal seed, and (c) rooted cuttings. Upper Amazonian varieties have proved vigorous and early-bearing compared with the ordinary amelonado, and there is no indication that they require the best conditions to express the early-bearing character. Trials have been laid down at 9 stations to compare amelonado, hybrid and Amazonian varieties.

2170. van der Knaap, W. P.
Productiegegevens van veredeld cacao plantmateriaal. (**Production data on clonal cacao.**) [English and Indonesian summaries 9 and 10 lines respectively.]
Bergcultures, 1956, **25**: 27-33, bibl. 5, illus.

Mainly as a result of using unselected planting material, the average production of cacao estates in Java is only 250 kg. per ha. Well-husbanded plantations of the clones DR1, DR2 and DR38, which are described, can average 1,000 kg. cacao per ha.

2171. Archibald, J. F.
The propagation of cacao by cuttings.
Tech. Bull. W. Afr. Cocoa Res. Inst. **3**, 1955, pp. 6, illus., 1s. 6d.

The subjects covered include the Trinidad propagator, the W.A.C.R.I. propagating frame, the preparation of cuttings, the use of IBA to promote root growth, and the hardening and storage of rooted cuttings.

2172. Archibald, J. F.
Vegetative propagation.
A.R. W. Afr. Cocoa Res. Inst. 1954/55, 1955, pp. 76-7.

Simplified techniques. One hundred 2-leaf cuttings of S36 previously given a quick dip in β-indolebutyric acid were planted obliquely with the leaves resting on the soil in a well-watered, shaded bed 6 in. deep and then covered with a polythene sheet which was laid directly on top of the leaves and weighted at the edges. After a month during which no water was given 57 cuttings had rooted, 2 were dead and 41 were healthy but unrooted. *Improvement of methods.* Cuttings of a good, a medium and a poor rooting clone planted at monthly intervals from April 1953 to June 1954 received 3 ringing treatments. The results were: (1) The season of planting markedly affected rooting in all 3 clones, the best rooting occurring during the wet season. (2) The total number of cuttings rooted was greatest in the good-rooting clone. (3) The poor rooting in the medium clone was due to a sharp fall in the numbers rooting at the onset of the dry season. (4) In the medium- and the poor-rooting clones the mean number of roots produced per cutting was related to the season of planting, a fall in the number of roots coinciding with the onset of the dry season. (5) In the poor-rooting clone mechanical ringing of the cortical tissue of the petiole significantly increased the number of roots per cutting compared with chemical ringing and no ringing. (6) In the medium- and poor-rooting clones the mean number of roots per cutting was positively correlated with the number of cuttings per monthly batch which rooted.

2173. Desrosiers, R., and von Buchwald, A.
Fungicidal treatments for control of cacao cutting disease in Ecuador.
FAO Plant Prot. Bull., 1955, **4**: 17-21, illus.

In Ecuador losses of cacao cuttings in the propagating bins have occurred from time to time. These are apparently due to a complex of causes, *Diplodia theobromae*, *Fusarium* spp., certain saprophytic nematodes and bacteria having been found consistently associated with the deaths of cuttings. Symptoms commonly noted are poor rooting, often accompanied by a brown discoloration of the base of the cuttings which, in severe cases, may be involved in a moist rot and sloughing of the bark. A spectacular yellowing of the leaves, which rapidly turn brown and absciss, often occurs. Incidence of disease may vary widely from one propagating bin to the next with 30 to 90% of cuttings showing infection. Of 6 fungicides tested for the control of the disorder by application to the water in which the cuttings were prepared and transported to the bins, Fermate at 0·25% and Zerlate at the same rate gave the best results, namely, 8·20 and 6·91 roots per plant respectively compared with 4·96 in the control, and 68·3% and 66·7% respectively of plants with 4 or more roots compared with 35·8% in the control.—Trop. agric. Exp. Stat., Pichilingue.

2174. Benstead, R. J., and Wickens, R.
Establishment and maintenance.
A.R. W. Afr. Cocoa Res. Inst. 1954/55, 1955, pp. 65-73.

Establishment trials: In a new trial with 3 temporary shade treatments applied to cacao sown at stake on old cacao land there were no significant differences in survival rates, which averaged 62%. *Transplanting experiments:* In general, the survival rate of 7- and 8-month-old seedlings was much inferior to that of 4- to 6-month-old seedlings. *Spacing trials:* In the West African Amelonado spacing experiment planted

in 1947 (1) the yield in pods per tree and dry cacao per acre fell as density increased from 200 to 2,800 trees per acre, but (2) the weight of weed growth was 1,432 lb. per acre at a density of 200–400 trees per acre compared with only 189 and 51 at densities of 600-1,000 and 1,200–2,800 respectively, and (3) the percentage of trees damaged by capsids was 32·4 at a density of 200–400 trees per acre compared with only 25·9 and 7·9 at densities of 600–1,000 and 1,200–2,800 respectively. A study of past yields of old trees in Tafo station at spacings ranging from 200 to 1,000 trees per acre also showed a decreasing yield per tree with increasing density. In the Upper Amazon spacing experiments pod yield per tree in both pruned and unpruned plots was significantly greater at 12 × 12 than at 8 × 8 feet.

2175. Adams, S. N., and McKelvie, A. D.
Environmental requirements of cocoa in the Gold Coast.
Rep. Cocoa Conf. Lond. 1955, Cocoa, Choc., Confect. Alliance, pp. 22-7, bibl. 11.

The factors discussed are rainfall, temperature, humidity, wind, soil, nutrient cycle and shade. Some of the conclusions are as follows. In the Gold Coast cacao requires a minimum of 10 in. rainfall during the dry season (November/March). Mean daily maximum temperatures of less than 83°–85° F. adversely affect flushing, flowering and pod growth. Cacao is a high-humidity plant but can survive short daily periods of low humidity. The Cape Coast granite soils are in general better for cacao than the phyllite and greywacke soils. In peasant culture topography may be more important than soil type. Soil phase is of paramount importance; cacao thrives on newly cleared forest soils, but soils of the same type which are farmed or under poor secondary bush are in general unsatisfactory.

2176. Murray, D. B.
Climatic requirements of cocoa with particular reference to shade.
Rep. Cocoa Conf. Lond. 1955, Cocoa, Choc., Confect. Alliance, pp. 17-22, bibl. 17.

In addition to shade this review covers the factors of temperature, rainfall, humidity, wind and light (photoperiod and intensity). It is concluded that the evidence at present available gives a picture of the ideal requirements for the crop of a high unvarying temperature, evenly distributed rainfall and its consequent high humidity, protection from wind and, on a highly fertile soil, little or no shade.

2177. Jolly, A. L.
The effect of age of tree on cocoa yields.
Rep. Cocoa Conf. Lond. 1955, Cocoa, Choc., Confect. Alliance, pp. 54-6, bibl. 3.

Earlier research is reviewed. Further data on the performance of cacao fields under estate cultivation on good brasso sand and chocolate soil have now been accumulated and a few individual field histories cover as much as 20 years. Although it is considered rather too early to come to a definite conclusion, the figures of recent replantings give the impression that such fields, even on good soils, have not the lasting power of their predecessors.

2178. Charter, C. F.
The nutrient status of Gold Coast forest soils with special reference to the manuring of cocoa.
Rep. Cocoa Conf. Lond. 1955, Cocoa, Choc., Confect. Alliance, pp. 40-8, bibl. 14.

Sickle-leaf and Mg deficiency are considered, and a plea is made for a thorough investigation of the Ca, Mg and S nutrition of cacao.

2179. Archibald, J. F., and Adams, S. N.
The role of "shade" in cacao cultivation.
A.R. W. Afr. Cocoa Res. Inst. 1954/55, 1955, pp. 91-3.

Investigations in progress are outlined. Amazon seedlings grown in pots in full sunlight or under artificial shade showed no differences either in growth rate as measured by leaf area or in response to NPK fertilizers. Other experiments are concerned with the effects of forest litter and of day-length and fertilizer treatment on the growth of seedlings and of organic and inorganic mulches in relation to shade and fertilizer treatment.

2180. Lemée, G.
Influence de l'alimentation en eau et de l'ombrage sur l'économie hydrique et la photosynthèse du cacaoyer. (**The effect of moisture supply and shade on the water relations and photosynthesis of cacao.**) [English and Spanish summaries ⅓ and ½ p.]
Agron. trop., 1955, **10**: 592-603, bibl. 15.

An account is given of 2 experiments carried out on Amelonado cacao at Adiopodoumé in the Ivory Coast. In the first the water relations of pot seedlings were studied. The results and conclusions were: (1) Optimum growth takes place when the available moisture in the soil exceeds two-thirds of field capacity. (2) Below this level growth, water absorption, stomatal opening and photosynthesis are progressively reduced as the soil approaches wilting point, while moisture deficit and suction force increase. (3) Even near wilting point the resumption of watering led to a rapid return to normal metabolism. (4) In saturated soil root necrosis caused the same symptoms as drought, but the resumption of drainage did not lead to a rapid return to normal growth. In the second experiment photosynthesis was studied in pot plants under shade and in mature trees in the field. The results and conclusions were: (1) Transpiration rose with the evaporation potential of the atmosphere and with exposure to insolation but, whereas adult leaves could offset losses by efficient conduction, given adequate soil moisture, growing leaves suffered a severe and possibly fatal shortage. (2) Stomatal opening and photosynthesis are proportional to light intensity up to an optimal point beyond which the effect of light is depressing. (3) Above a light intensity of 25% the rise in mean daily assimilation is negligible.

2181. van der Knaap, W. P.
Snoei van cacaobomen. (**Pruning of cacao trees.**) [English and Indonesian summaries 10 and 11 lines respectively.]
Bergcultures, 1955, **24**: 517, 519, 521.

The pruning of cacao trees is discussed. Systems used are related to tree age. Plant spacing has a direct

bearing on pruning requirements. Wide spacing encourages the formation of long branches which tend to break near the trunk if left unpruned.

2182. McKelvie, A. D.
Cherelle wilt.
A.R. W. Afr. Cocoa Res. Inst. 1954/55, 1955, pp. 89-90.

Studies were made on hand-pollinated pods of Amelonado, Trinitario and Amazon types of cacao. The results and conclusions were: (1) Wilt occurs in 2 phases, the first beginning a few days after fertilization and lasting till the 9th or 10th week and the second lasting from the 9th or 10th to the 14th week when the pods are 13–14 cm. long. (2) Second wilt is rare on young trees and is most abundant in August/September among main crop pods on mature trees. (3) The peak of the first wilt is reached about the 7th or 8th week after fertilization when the cell walls of the endosperm are being formed. (4) Second wilt occurs as embryo growth becomes rapid and ceases as pod metabolism and starch and fat formation increase. (5) Physical differences were observed between healthy and wilted pods in the second but not in the first wilt. (6) Wilt was unaffected by growth substance spraying, but in young clonal material it was reduced for a few weeks by removing developing leaf buds. (7) Chemical differences were found between healthy and wilted pods.

2183. Champel, P.
Étude de la morphologie de la cabosse du cacaoyer. **(Study on the morphology of the cacao pod.)**
Bull. Centre Rech. Agron. Bingerville, 1955, **10**: 3-42, bibl., from abstr. in *Trop. Abstr.*, 1956, **11**, No. d113.

The Forasteros form a relatively homogeneous population and the number of beans per pod is related to the length of the pod. In the case of the Trinitarios and the Calabacillos, however, the variability displayed by the form of the beans largely compensates for the differences in length.

2184. Lister, R. M., and Thresh, J. M.
Virus research.
A.R. W. Afr. Cocoa Res. Inst. 1954/55, 1955, pp. 93-101.

The Nigerian practice of cutting out all cacao within 30 yards of swollen shoot infection centres, in addition to the diseased trees themselves, involves the destruction of a large number of apparently healthy trees. Experiments at the Ibadan substation suggest the feasibility of coppicing such trees instead of cutting them out. Coppicing reveals the extent of virus infection more precisely and reduces the rehabilitation problem by sparing many healthy trees. It has been found that chupons develop less abundantly and more slowly when coppicing is done in the relatively cool, wet-season months of June/August than in the warmer months, and that failures to regenerate are only appreciable in trees that have lost most of their canopy.

2185. Wharton, A. L., and Wickens, R.
Black pod disease.
A.R. W. Afr. Cocoa Res. Inst. 1954/55, 1955, pp. 49-57.

Spraying and harvesting trials (Wharton, A. L.): Details are given of 2 trials at Bunso Plantation in which 4 different fungicides were applied fortnightly, monthly and every 2 months, and harvesting took place weekly and monthly. The results included the following: (1) Weekly harvesting increased the total pod number and the total weight of wet beans per tree and reduced the incidence of the disease and the percentage of black pods discarded. (2) Spraying did not appreciably affect the incidence of the disease. Trial I suggested that the incidence of rodent damage is higher than had previously been realized and that most infections at the proximal end of pods may result from cushion infection. *Frequency of picking experiments* (Wickens, R.): In tests at Tafo and Kukua the yields of good pods per tree increased, with one exception, as the interval between pickings was decreased from 12 to 3 days. *Cushion infection* (Wharton, A. L.): The numbers of pods infected at the proximal and distal ends were counted from June to December in an investigation on the possible origin of black pod disease from an infected cushion. During June and July the numbers of proximal and distal infections were high. As the rainfall diminished towards August there was a rapid reduction in distal infections, which became negligible during the month. The reduction in proximal infections was not so pronounced, so that during August they represented as much as 90% of total black pods recorded.

2186. Thorold, C. A.
Observations on black-pod disease (*Phytophthora palmivora*) of cacao in Nigeria.
Trans. Brit. mycol. Soc., 1955, **38**: 435-52, bibl. 29, illus.

In Nigeria few pods are infected basally with black-pod disease, lateral or distal infections being more common. More sporangia are liberated under rain-splash conditions than in dry air. Some evidence has been found that sporangia from the soil cause pod infection. Black-pod incidence is mainly determined by the number of pods available and by climatic conditions. —Dep. agric. Res., Nigeria.

2187. Desrosiers, R., and Diaz M., J.
Efecto de diversos fungicidas en el combate de la podredumbre de las mazorcas causada por la monilia. **(Effect of various fungicides on monilia pod rot.)**
Agric. trop. Bogotá, 1955, **11**: 759-63.

Of 7 fungicides tested against monilia pod rot (*Monilia roreri*) of cacao at Pichilingüe Experimental Station, Ecuador, in 1954, wettable sulphur at 10 lb. per 100 gal. water gave the best results, namely a 290% yield increase over that of the same plots untreated in the previous year compared with an increase of 45% in the control plots, and a 72% decrease in monilia pod rot compared with a 20% decrease in the controls. Part of the yield increase in the sulphur plot is attributable to control of anthracnose and diplodia. Parzate at 2 lb. and yellow cuprocide at 1 lb. per 100 gal. also gave excellent control. The fungicides were applied at intervals of 7–10 days from January to November.

2188. Taylor, D. J., and others.
Capsid studies.
A.R. W. Afr. Cocoa Res. Inst. 1954/55, 1955, pp. 58-65.

Regeneration of damaged areas (Taylor, D. J. and Raw, F.): Coppicing and chemical control have given

very variable results so far. *Chemical control on young, bearing trees* (Mapother, H. R.): Effective control has been given by aqueous emulsions of DDT or BHC applied to jorquettes or branch unions by means of a compressed-air sprayer with a lance and a special nozzle delivering spray in a solid, narrow cone of relatively coarse droplets. *Population studies* (Taylor, D. J.): In the Tafo district population fluctuations are related to preceding weather conditions. In 1954-55 the maximum populations for both *Distantiella theobroma* and *Sahlbergella singularis* occurred in September. *Cultural control* (Taylor, D. J. and Wickens, R.): An account is given of experiments to test the efficacy of a method successfully used in low-canopy plantations in the Belgian Congo [see *H.A.*, 25: 3263].

2189. Knight, R., and Mapother, H. R.
Insecticide studies.
A.R. W. Afr. Cocoa Res. Inst. 1954/55, 1955, pp. 86-8.

Effect of insecticides on fruit setting and yield (Knight, R.): Contrary to experience in Colombia [see *H.A.*, 24: 3129 and 3130], gross yields were not reduced by field spraying with either DDT or copper fungicides. *Systemic insecticides* (Mapother, H. R.): Further experiments with Hanane [dimefox] are described.

2190. Hanna, A. D., Judenko, E., and Heatherington, W.
Systemic insecticides for the control of insects transmitting swollen-shoot virus disease of cacao in the Gold Coast.
Bull. ent. Res., 1955, **46**: 669-710, bibl. 11, illus.

An account is given of experiments in the Gold Coast in 1950/53 on the control of cacao mealybugs, especially *Pseudococcus njalensis*. Of the 4 insecticides used paraoxon, parathion and schradan were unsatisfactory either as spray or soil applications or as tree injections, but dimefox was effective both as a soil application and as a trunk injection. A scale for effective dosage was established in g. per in. girth as a soil application, and the residual effect was found to last about 7 weeks. Subsidiary investigations showed that the effectiveness of dimefox applied to the soil was only slightly affected by heavy rain and not at all by defoliation of the trees, that there was apparently no detrimental effect on pollinating insects, and that the cacao beans were not rendered toxic. Preliminary trunk injection experiments showed that the best method of application is in 4 holes $\frac{5}{16}$ in. in diameter and 3·5 in. deep drilled at soil level, and suggested that a suitable rate would be 160–250 p.p.m. of the weight of the tree [see also H.A., 24:3132]. The following conclusions are drawn: (1) Soil treatment with dimefox is a simple, rapid and very effective method of reducing mealybug population to a very low level. (2) Trunk injection is also very effective and results in considerable savings in insecticide compared with soil application, but is very slow when carried out by hand.—Chesterford Park Res. Stat., Essex.

2191. van Dijck, J. I., and Ostendorf, F. W.
Het fermenteren van cacao. **(Cacao fermentation.)** [English summary 2 pp.]
Surinaam. Landb., 1955, **3**: 283-96, 336-47, bibl. 7.

Experiments with beans of clone ICS 95 have shown that a satisfactory product can be obtained either by fermentation followed by washing, drying, re-fermentation and re-drying or by a longer period of fermentation followed by soaking, washing and drying. Re-fermentation can also be used to improve the quality of poorly prepared, small-holders' cacao. The construction of fermentation bins on estates is described, and the need for co-operative fermentation and drying units to serve small growers is discussed.

2192. Dittmar, H. K. F.
Versuche zur Kakaowaschung. **(Research on cacao washing.)** [English, French and Portuguese summaries.]
Gordian, 1955, **55**(1319): 15-19.

Alkaline solutions of sodium hydroxide or potassium carbonate were used to wash freshly-harvested cacao beans. The danger of excess alkalization of the beans was largely avoided by the strong buffering action of the alkali citrates and tartrates of the pulp. Differences in pH values of the cotyledons of beans washed in water and those washed in alkali were negligible. Greater differences in pH values occurred in the husks.—Inst. Tech. Bahia, Salvador, Brazil.

2193. Spoon, W., and Sesseler, W. M.
Fumigatie van cacaobonen met methylbromide. **(Fumigation of cacao beans with methyl bromide.)** [English summary $1\frac{1}{4}$ p.]
Cacao-Chocolade-Suikerwerken, 1955, **23**: 355, reprinted as *Ber. Afd. trop. Prod. kon. Inst. Tropen* **252**, 1955, pp. 8, bibl. 5.

Cacao beans were fumigated with methyl bromide at the rate of 2 lb. per 1,000 cu. ft. for 24 hours. Bromine residue in the beans varied between 20 and 39 p.p.m., and averaged 29 p.p.m. In the shell up to 119 p.p.m. had been absorbed, while the cotyledons absorbed only 13 p.p.m. In chocolate manufactured from fumigated beans only 4 p.p.m. of bromine was found.

Coconuts.

(*See also* 1342, 2305j, k, v, 2306b, g, h, k.)

2194. Ceylon Coconut Research Institute.
Annual Report of the Coconut Research Board of the Coconut Research Institute for 1953, 1955, pp. 55, Re. 1.70.

Work covered by this report includes: *Soil Chemistry Division:* Laboratory investigations have shown that at Bandirippuwa the available phosphates in the soil have now been reduced to the low levels at which a response could be expected, yet after 18 years there is still no significant response to applications of P_2O_5 and K remains the dominant requirement on this soil. At Ratmalagara Research Station, conversely, the response to P_2O_5 is highly significant, while K gives no response because ample supplies are already available in the soil. Investigation of this fundamental problem is still proceeding. The fungus disease *Helminthosporium incurvatum* on young palms at Ratmalagara persists in association with high levels of applied N and low levels of applied P_2O_5, although leaf analysis has not revealed any differences in these elements between healthy and diseased palms. Manurial trials have shown that, based on 4 years' records, there is no significant difference between responses to the

application of manures by broadcasting and in circular trenches. The root systems of a number of palms have been traced and it has been found that the lateral roots intermingle and reach the manurial circles of adjacent palms. *Botanical Division:* Experiments show that there are no significant differences in the yields of nuts and copra from adult palms, whether the original seed-nuts are taken from selected, high-yielding palms or from selected, high-yielding blocks. Selection of seedlings at the nursery stage, however, leads to earlier flowering and subsequently to markedly higher yields of nuts and copra. It has been proved that there are no significant differences in the yield of either nuts or copra as between monthly and bi-monthly picking. Hydrocyanic gas has been found to be satisfactory in destroying mites in collected pollen without affecting the pollen viability. *Technological Chemistry:* In experiments on the storage under different conditions of nuts picked at various stages of maturity, nuts over 14 in. diameter and withered one month in the field gave the best germination. Other subjects studied were vinegar manufacture from toddy and the possible recovery of by-products of commercial value from the waste effluents of arrack distilleries. *Animal husbandry:* Experience shows that indigenous dairy cattle maintained in coconut plantations on a diet of rough pasture and coconut poonac can produce rich milk at a handsome profit. [The 1952 report has also been received.]

2195. Ceylon Coconut Research Institute.
The Coconut Conference, 29 August 1955, Bandirippuwa Estate, Lunuwila.
[*Publ.*] *Ceylon Coconut Res. Inst.*, 1955, pp. 32, illus.

Papers read at this conference and reported here include: "The commercial possibilities of manufacturing high grade vinegar from coconut toddy" (by W. R. N. Nathanael); "Planting material for coconuts" (by D. V. Liyanage); "Some new aspects of coconut manuring" (by M. L. M. Salgado); and "Agronomy and the coconut industry" (by T. B. Paltridge).

2196. Satyabalan, K.
Plant introduction for the improvement of crops with special reference to coconut.
Indian Coconut J., 1955, **8**: 113-17, bibl. 8.

Seed nuts from various localities in Asia, East Africa, Central America, the West Indies and the Pacific have been planted at the Central Coconut Research Station, Kasaragod. The external characters of the nuts are tabulated.

2197. Rao, M. B. S., and Koyamu, K.
The dwarf coconut.
Indian Coconut J., 1955, **8**: 106-12, bibl. 9.

The two dwarf coconut types encountered in the Chowgat area of Madras, the dwarf green (f. *maldiviana*) and the dwarf yellow (f. *nana*), were studied and compared with similar types growing elsewhere. They are not economical for cultivation on a plantation scale. Their use is limited mainly to ornamental gardening. The green type in particular is valuable as a pollen parent for the coconut breeder. [From authors' summary.]—Agric. Res. Stats, Tindivanam and Pilicode.

2198. Frémond, Y., and Gros, D.
Fumure minérale du cocotier en Côte d'Ivoire. Premiers résultats. **(Mineral fertilization of coconuts on the Ivory Coast. Preliminary results.)**
Oléagineux, 1956, **11**: 45-51, bibl. 14, illus.

In a factorial experiment laid down near Port-Bouet in 1952 4 levels of K, N and no N, and P and no P were applied annually to 6-year-old coconuts showing leaf scorch and very low leaf K contents. After 3 years the comparative results with 1·5 kg. and no potassium sulphate per tree per annum (and no N or P) were 16·3 and 9·6 kg. copra per tree, 2,540 and 1,500 kg. dry copra per ha. and 63,500 and 37,500 fr. annual revenue per ha. The net increase in revenue per ha. was 21,250 fr.

2199. Nutman, F. J., and Roberts, F. M.
Frond-drop. A note on an abnormal condition of coconut palms in Jamaica.
Emp. J. exp. Agric., 1955, **23**: 268-70, bibl. 8, illus.

Palms of all ages may be affected by frond-drop, but symptoms are more definite in young palms. The first sign of abnormality is the collapse of the older and lower fronds, which is followed by the collapse of progressively younger fronds until only a central tuft of abnormally short and pale fronds remains. The collapse is caused by buckling at the base of the petiole. It is suggested that the disorder is pathogenic in origin, and that as it has many points of similarity with kadang-kadang disease it may also be caused by a virus infection. —Coconut and Banana Res. Unit, Jamaica.

2200. Nutman, F. J., and Roberts, F. M.
Lethal yellowing: the "unknown disease" of coconut palms in Jamaica.
Emp. J. exp. Agric., 1955, **23**: 257-67, bibl. 13, illus.

Lethal yellowing, a serious disease of coconut palms in the Caribbean area, is clearly of pathogenic origin. It is possibly caused by a virus, but transmission tests to prove this are not yet feasible. Direct control seems impracticable, and the use of resistant varieties seems to offer the best chance of re-establishing devastated plantations. One resistant variety is already available.—Coconut and Banana Res. Unit, Jamaica.

2201. Nagaraj, A. N., and Menon, K. P. V.
Observations on root decay in coconuts, its cause and its relation to the foliar symptoms of disease in the disease belt of Travancore-Cochin.
Indian Coconut J., 1955, **8**: 97-105, bibl. 13, illus.

The common foliar symptoms of disease met with in the disease belt of Travancore-Cochin have been classified into four categories, viz., wilt or root, tapering stem, yellowing of outer leaves accompanied by nut-fall and general chlorosis. The symptoms in each category are described. A comparative study of the root systems of healthy trees and those exhibiting different types of foliar symptom showed that only tapering stem symptoms were consistently associated with a high percentage of root decay. Some of the healthy trees had a high percentage of decayed roots, while a few palms in early stages of wilt disease were free from root

decay. There was no significant difference in the extent and frequency of root decay between healthy trees and those in early stages of wilt (root) disease; the name "wilt disease" therefore seems more appropriate than "root disease" to describe this disorder. Root rotting observed in the middle and advanced stages of wilt disease, and in the other two categories (yellowing of outer leaves, and general chlorosis) might be a secondary effect of disease. In the infection experiments with isolates of three fungi, *Rhizoctonia* [*Corticium*] *solani*, *R. bataticola* and *Botryodiplodia theobromae*, only one isolate of *R. solani* parasitized coconut roots, causing a brown rot of tissues. Nematodes associated with soft rot of roots could not infect living coconut roots and are probably saprophytic. Observations have indicated that biting insects might also contribute towards death of coconut roots and that a persistent high water table or a hard soil pan might pave the way for root decay. [From authors' summary.] —Centr. Coconut Res. Stat., Kayangulam.

2202. Nirula, K. K.
Investigations on the pests of coconut palm. Part I.
Indian Coconut J., 1955, **8**: 118-30, bibl. 44.

This paper includes information on the distribution of the coconut palm in India and the area under cultivation in the various states and its ecology, and provides notes on the 4 major pests on the west coast of India, namely, *Oryctes rhinoceros*, *Nephantis serinopa*, *Rhynchophorus ferrugineus* and *Leucopholis coneophora*, and on 21 minor pests in the area. Future parts of the paper will be devoted to the 4 major pests.

2203. Mariconi, F. A. M., and Zamith, A. P. L.
Contribuição para o conhecimento da *Brassolis sophorae* (Linnaeus, 1758), *B. astyra* Godart, 1821 (Lepid.-Brassolidae) e de seus inimigos naturais. (**Contribution to the knowledge of *Brassolis sophorae* and *B. astyra* and of their natural enemies.**) [English summary ⅓ p.]
Ann. Esc. sup. Agric. Queiroz, 1954, **11**: 159-214, bibl. 79, illus.

The subjects covered are distribution, host range, biology and control, with particular reference to natural enemies of these serious pests of coconut, carnauba and other palms.

Coffee.

(*See also* 1295, 2150, 2152, 2305b, d, q, u, z, 2306q, x.)

2204. Indian Coffee Board.
Seventh Annual Report of the Research Department of the Indian Coffee Board (1953-54), pp. 91, R.1, being *Bull. Res. Dep. Indian Coffee Bd* 7.

The report includes the following: *Agronomy*. Agronomy practices (digging, mulching, weeding, pruning and manuring), leaf mulches, robusta manuring, pruning and topping, blossom/berry correlations and maintenance of fertility. *Botany*. Breeding, selection, vegetative propagation and training. *Chemistry*. Manuring, hedgerow planting, analyses of soils and of coffee and cover crop material. *Entomology*. Control of white stem borer (*Xylotrechus quadripes*) and eelworms, studies of greenbug parasites (*Empusa lecanii* and *Cephalosporium lecanii*). *Mycology*. Copper fungicide trials, studies on a fungus, probably *Aspergillus tamarii*, entomogenous on white stem borer. *Senior Liaison Officer*. Research on arabica and robusta selections, catalysation of nutrients, arabica manuring and cultivation, robusta pruning, fungicide and insecticide studies.

2205. Pereira, H. C., and Jones, P. A.
Field responses by Kenya coffee to fertilizers, manures and mulches.
Emp. J. exp. Agric., 1954, **22**: 23-36, bibl. 25, and *Mon. Bull. Coffee Bd Kenya*, 1955, **20**: 298-300, 324-7, bibl. 25.

Field experiments on coffee in Kenya showed that, over the range of conditions in which the bulk of this colony's coffee is produced, neither yield nor quality of the crop was affected by the usual dressings or by heavier dressings of either cattle manure or phosphates. Crop yields were sometimes increased when nitrogenous fertilizers were given at heavy rates. Coffee yields depend greatly on annual rainfall. Soil moisture measurements showed that important additional conservation of water could be achieved by applying grass mulches before the rains to improve reception rather than by the customary applications after the rains to prevent evaporation. Field trials confirmed this by large yield increases when a mulch was applied before the rains. Soil structure was greatly improved under grass mulches. Organic matter should therefore be applied directly in coffee plantations as surface protection rather than be converted to manure and dug in. The nutrients supplied in grass mulches are considerable and exceed those removed annually in the coffee crop. They should be made good in the soil which produces the grass. [Authors' summary.]— —Coffee Res. Stat., Ruiru, Kenya.

2206. Loue, A.
Études sur la nutrition minérale du caféier en Côte d'Ivoire. (**Studies on the mineral nutrition of coffee in the Ivory Coast.**)
Bull. spéc. Centre Rech. agron. Bingerville, 1955, pp. 68, bibl. 51, illus.

A detailed account is given of nutrient-solution experiments and field studies on the N, P, K, Ca, Mg, S, Fe, Mn and B nutrition of robusta coffee. *Qualitative and quantitative study on mineral deficiencies* (bibl. 21). Growth was studied in relation to deficiency of each of the cited elements, and coloured illustrations are presented of leaves displaying deficiency symptoms. The critical leaf contents for the display of symptoms of certain elements are: N 1·5%, P 0·06%, K 0·3%, Ca 0·25% and Mg 0·30%. *Exploratory use of leaf analysis for the study of minor elements* (bibl. 7). The results of studies on Fe, Mn, Zn and B at 3 stations were: (1) Fe leaf contents ranged from 84–172 to 180–855 p.p.m.; 80 p.p.m. was the critical level; when deficiency symptoms did occur, they were observed chiefly in the rainy season, particularly at the beginning when growth was active. (2) Mn leaf contents were 64–93, 47–95 and 31–46 p.p.m. respectively, at the 3 stations; a Fe/Mn ratio approaching unity appeared to result in ill health. (3) Zn investigations gave inconclusive results. (4) B content was always lowest during the driest season of the year; leaf B should lie between 20 and 100 p.p.m.; 60 p.p.m.

represents adequacy; at about 10 p.p.m. there is severe, and at about 15 p.p.m. moderate, deficiency; deficiency reacts on the growing points. *A comparison of the leaf analyses of coffee in the Daloa and Bingerville regions* (bibl. 12). In the coastal lagoon zone (Bingerville region) of the Ivory Coast, where the soils are derived from recent sands, leaf analysis indicates poor nutrition. At Daloa and elsewhere in the main coffee belt, where the soils are chiefly of granito-gneiss origin, conditions are much more suitable for coffee growing. *Effect of mineral fertilization on the chemical composition of the coffee bean and the problem of the removal of fertilizer elements with the crop* (bibl. 11). Conclusions were: (1) The composition of the beans is only slightly affected by mineral fertilization. On the average, 1 kg. dry beans represents a loss of 25 g. N, 4·5 g. P_2O_5 and 20 g. K_2O when parchment and pulp are returned to the soil, or 35, 7 and 38 g. when they are not. (2) By contrast, mineral fertilization has a considerable effect on the composition of the parchment and pulp; these components should be returned to the soil.

2207. Franco, C. M., and Mendes, H. C.
Deficiência de zinco em cafeeiro. (**Zinc deficiency in coffee.**) [English summary 12 lines.]
Bol. Super. Serv. Café, S. Paulo, 1954, **29**(334): 34-9, bibl. 5.

The symptoms are described of zinc deficiency which is fairly common in coffee in São Paulo, especially on the red earths. Spraying 6-year-old trees with 6 g. zinc sulphate per l. with or without lime caused the disappearance of symptoms in most cases and great improvement in the rest. The omission of lime did not result in any injuries. The response to September treatment was more rapid than that to June treatment.

2208. d'Souza, G. I.
Incidence and control of leaf-disease (*Hemileia vastatrix* B. and Br.) of arabica coffee on the Bababudangiris.
Indian Coffee, 1955, **19**: 267-8.

Recommendations on bordeaux mixture spray schedules are based on field observations of spore germination. The schedules vary with locality and range from 2 applications per annum in May and August or September to 4 in May, August, September and November. Concentrations range from 4 : 4 : 40 to 1 : 1 : 40.

2209. Medina Perez, J.
La palomilla del café. (**The coffee mealybug.**)
Agric. trop. Bogotá, 1955, **11**: 743-51, bibl. 11.

Notes are given on the biology of *Puto antioquensis*, which mainly attacks the roots of coffee, symptoms of attack, and control by 3 fortnightly applications to the base of the trunk of 3–5 l. per tree of chlordane, or calcium or sodium cyanide with or without DDT.—Serv. téc. agríc. Colomb.

2210. Lordello, L. G. E.
Observações sôbre alguns diplópodos de interêsse agrícola. (**Notes on some millipedes of agricultural importance.**) [English summary 1 p.]
Ann. Esc. sup. Agric. Queiroz, 1954, **11**: 69-76, bibl. 10, illus.

Among the millipedes mentioned is *Orthomorpha coarctata* which attacked coffee nursery plants. Dusting with BHC prevented the attacks.

2211. Coleman, R. J., and others.
Pectic acid from the mucilage of coffee cherries.
Arch. Biochem. Biophys., 1955, **59**: 157-64, bibl. 13.

A polysaccharide extracted from crude coffee cherry mucilage consisted mainly of galacturonic acid and behaved like pectic acid.—Fleischmann Labs, Standard Brands, Inc., Stamford, Conn.

Mangoes.

(*See also* 2306b.)

2212. Ledin, R. B., and Ruehle, G. D.
Mango selection, propagation and culture.
A.R. Fla agric. Exp. Stats, 1954, pp. 291-2.

Three promising new varieties are described. Propagation of mango by air-layering was successful but the roots were so brittle that few plants survived potting. Treatment with 1% α-NAA in lanolin paste did not appear to aid root formation.

2213. Ullah, H., and Ali, S.
Review of mango budding *in situ* in the Punjab.
Pakistan Rev. Agric., 1955, **2**: 74-6, 96.

Advice is given on varieties, rootstock characters, T-budding and after-care. The percentage of success is higher with spring than with autumn buddings and in mild than in hot weather.

2214. Kennard, W. C., and Spencer, J. L.
A mechanical insect collector with high manœuverability.
J. econ. Ent., 1955, **48**: 478-9, bibl. 2, illus.

The apparatus described, which is an adaptation of the hand-type vacuum cleaner, was designed to collect pollinating insects from mango flowers.

2215. Tandon, R. N., Sisodia, U. S., and Bilgrami, K. S.
Pathological studies of *Pestalotia mangiferae*.
Proc. Indian Acad. Sci. Sect. B, 1955, **42**: 219-25, bibl. 13, illus.

Pestalotia mangiferae has been observed on leaves of *Mangifera indica* at Allahabad and Madras. The pathogenicity of this organism has been established on leaves, stem and fruits of mango and symptoms have been described. Storage of fruits at temperatures below 8° C. prevented fruit rot.—Dusting the leaves with zinc sulphate controlled the disease but similar dustings on fruits failed to control the rot. [From authors' summary.]—Dep. Bot., Univ. Allahabad.

Oil palms.

(*See also* 2155, 2306h.)

2216. Ferwerda, J. D.
Germination of oil palm seeds.
Trop. Agriculture Trin., 1956, **33**: 51-66, bibl. 12.

The results of experiments by the Research Depart-

ment, Huilever S.A., Belgian Congo, on the germination of dura seeds were as follows: (1) *Removal of pericarp*. The speed of germination is slightly increased, although only initially, by retaining the pericarp for a period of three days, but is greatly decreased if this period lasts longer than a week. The final percentage of germination is not affected if the pericarp is removed within a week, but seems to decrease if this is done after two or more weeks. (2) *Nut treatment*. Soaking only slightly affects the initial speed of germination, but removal of the shells causes a considerable increase. The seedlings originating from both soaked seeds and germinated kernels, especially from the latter, are less vigorous than those obtained from seeds receiving the standard treatment. (3) *Germination media*. Wood charcoal is an outstanding germination medium for oil palm seeds compared with sawdust, sand and pericarp fibre. (4) *Temperature*. The optimum temperature for germinating oil palm seeds seems to be in the vicinity of 38° C., but only temperatures below 37° C. are likely to retard germination considerably, and those above 40° C. to decrease the germinative power. The speed of germination is greatly improved by a periodical decrease in temperature. The speed of germination is improved by a better aeration of the seed, but only if it is submitted at the same time to fluctuating temperatures. (5) *Moisture conditions*. The speed of germination increases with increasing moisture content of the medium, the best results being obtained in very nearly saturated charcoal.

2217. Bull, R. A.
Nutritional problems in oil palm cultivation in Nigeria.
Commonw. phytopath. News, 1955, **1**: 52-3, illus., and 1956, **2**: 12-13, bibl. 5.

The disorders discussed are: (1) confluent orange spotting of the leaves due to K deficiency and possibly associated with infection by *Fusarium oxysporum*; (2) orange frond disease due to Mg deficiency; (3) combined K and Mg deficiency; (4) plant failure due to deficiencies of K and/or Mg, perhaps in conjunction with deficiencies in other elements, and possibly associated with infection by *Fusarium oxysporum*; (5) littleleaf disease due in most cases to B deficiency; and (6) multiple deficiencies.—W.A.I.F.O.R., Benin.

2218. Twitchin, J. F.
Palm oil machinery: digestion and pressing.
Planter, 1955, **31**: 544-52, illus.

This paper gives information and advice, with diagrams, on the operation of a digester and presses manufactured by a Dutch firm for the processing of Deli dura nuts, and on an incinerator for threshed bunches.

2219. Desassis, A.
La détermination de la teneur en huile de la pulpe de fruit d'*Elaeis guineensis*. (**Determination of the oil content of the fruit pulp of *Elaeis guineensis*.**)
Oléagineux, 1955, **10**: 739-43, 823-7, bibl. 10.

The method described is based on the linear relationship existing between moisture and fatty products in fresh pulp.

Papaws.

(*See also* 2306r.)

2220. Prest, R. L.
Unfruitfulness in pawpaws.
Qd agric. J., 1955, **81**: 144-8, illus.

Where unfruitfulness of pawpaws is due to poor pollination it may be corrected by hand pollination, which is fairly simple with young trees. Where unfruitfulness is inherent, only good strains should be propagated.

2221. Valsechi, O., and Mitidieri, J.
O brix na determinação da riqueza em açúcares do mamão como auxiliar no melhoramento do mamoeiro (*Carica papaya* L.). (**Brix in the determination of the sugars content of papaws as an aid in breeding.**) [English summary ⅓ p.]
Ann. Esc. sup. Agric. Queiroz, 1954, **11**: 85-92, bibl. 10.

A positive and significant correlation was found to exist between the content of solids as determined in the field by a refractometer and the content of total sugars. The formula is $a=0{\cdot}57s$ where a represents total sugars as glucose and s represents total solids.

2222. Shoji, K., Arisumi, T., and Akamine, E. K.
Papaya storage can be controlled.
Hawaii Fm Sci., 1956, **4**(3): 3, 5, illus.

Quarantine regulations require that papaws must receive one of the following treatments before shipment to the Mainland: (1) vapour-heat, fruit temperature at 110° F. under saturation for 8¾ hours; (2) vapour-heat quick run-up, fruit temperature raised to 117° F. under saturation; (3) EDB ½ lb. per 1,000 cu. ft. for 2 hours at 70°F.; or (4) EDB 1½ lb. per 1,000 cu. ft. for 2 hours on prepackaged papaws. Recommendations in the light of recent experiments are: (1) An additional 2 hours should be given in the vapour-heated, quick run-up method. (2) If EDB fumigation is used, the fruits should first be immersed for 2 hours in water at 110–120° F. (3) Pack only fruits that have ¼ colour showing during the summer, and more than ¼ colour showing during the winter, months. (4) Shipping the ¼ to ½ ripe fruits at 45° F. will further aid in reducing the decay problem.

Pineapples.

(*See also* 1695, 2150, 2305i, 2306i.)

2223. Sideris, C. P., and Krauss, B. H.
Transpiration and translocation phenomena in pineapples.
Amer. J. Bot., 1955, **42**: 707-9.

Sister suckers at the vegetative, budding and flowering stages were removed from mother pineapple plants and kept in moisture-deficient conditions in a glasshouse for 3 months. Half of the suckers were exposed to light and half were shaded. Losses in leaf weight as a result of transpiration varied between the 3 types of sucker; losses in shaded suckers were significantly less than those in exposed suckers. Translocatory leaf losses were appreciable in suckers at the flower-bud and flowering stages, but were very small in vegetative suckers.—Pineapple Res. Inst., Hawaii.

2224. Py, C., and others.
La fumure de l'ananas en Guinée. **(Manuring pineapples in Guinea.)**
Fruits d'Outre Mer, 1956, **11**: 5-23, bibl. 70, illus.

Following a review of recent literature on pineapple nutrition information is given on a fertilizer programme that has given good results at Foulaya. Two formulations are used, 4–2–4 during vegetative growth, followed by 3–2–8 for several months before the differentiation of the inflorescence, especially where the fruit is to be exported fresh. For fruit for processing the first formula can be used throughout. The fertilizer is applied either in the axils of the basal leaves with a spoon or, in the case of smaller plants, to the soil.—I.F.A.C., Foulaya.

2225. Sideris, C. P.
Effects of sea water sprays on pineapple plants.
Phytopathology, 1955, **45**: 590-4, bibl. 24, illus.

Pineapple plants grown in fields located within 1·5 miles of the sea and exposed to wind-blown sea water sprays develop leaf-tip necrosis that extends toward the proximal tissues and may result in death of approximately 25% of the leaf area. The symptoms of the injury appear as bands of alternating dark-brown and light-brown hues. Leaf tissue injury is more extensive in old and mature leaves than in young ones, because of chloride intake for longer periods by the former than by the latter. Partial control is effected by plantings in multiple rows of *Casuarina equisetifolia* on the seaward side of pineapple fields for the trapping of wind-blown sea water. Soil fumigation did not materially reduce leaf-tip necrosis but increased plant growth and resulted in higher fruit weights and quality, thus overcoming the adverse effects of chlorides on fruit yield. [From author's summary.]—Pineapple Res. Inst., Hawaii.

2226. Gowing, D. P., and Leeper, R. W.
Induction of flowering in pineapple by beta-hydroxyethylhydrazine.
Science, 1955, **122**: 1267, bibl. 4.

Beta-hydroxyethylhydrazine gave no activity in the split-pea-stem test or in the *Avena* test and has none of the structures associated with plant-growth-regulator activity, but it has induced early flowering in two tests at different seasons in the Cayenne pineapple. The chemical was applied in water by sprinkling on to 20 one-year-old plants at each of 4 concentrations in each test. In the first the 2 highest concentrations (0·06 and 0·12%) resulted in the production of flower buds in 17 and 20 plants respectively, compared with one in the control, 2 months after treatment in mid-May. In the second the 2 highest concentrations (0·12 and 0·23%) resulted in the production of flower buds in 13 and 18 plants respectively, compared with none in the control, 2 months after treatment in mid-September. —Pineapple Res. Inst. Hawaii.

2227. Cannon, R. C., Berrill, F. W., and King, K.
Can black heart of pineapples be avoided?
Qd agric. J., 1955, **81**: 321-8, illus.

There are two major cropping periods in Queensland—summer and winter. As a general rule the ratoon crop, at least in southern Queensland, is harvested about 18 months after the plant crop. Thus a summer plant crop is followed by a winter ratoon crop. The losses from black heart, a physiological breakdown in the flesh of the maturing fruit, are greatest in fruit harvested in July and August, and can largely be avoided, if culture is regulated in such a way that fruit does not come to maturity during these winter months. This can be done by advancing the plant crop by acetylene or NAA treatment, or by harvesting the plant crop at the normal time and forcing the suckers for an autumn crop. Advice is given on the regulation of cropping by a combination of these methods.

Rubber trees.

(*See also* 2166, 2305e, 2306d, w.)

2228. van Heusden, W. C.
Rejuvenatie van rubber, een gebiedende noodzaak. **(Rubber rejuvenation, an urgent necessity.)** [English and Indonesian summaries ½ p. each.]
Bergcultures, 1955, **24**: 422-7.

The causes of the downward trend in rubber production of the main producing countries are discussed. A large proportion of the producing plantations are more than 30 years old and have passed their production peak, while new plantations of selected high-yielding material are not yet in production.

2229. Liefstingh, G.
Op grote schaal aanbevolen heveaplantmateriaal in de practijk. **(Practical results with hevea material recommended for large-scale planting.)** [English and Indonesian summaries 11 and 17 lines respectively.]
Bergcultures, 1955, **24**: 429-33, bibl. 5, illus.

The first results are discussed of the 1954 inquiry into yields of hevea material recommended for large-scale planting. Data have been obtained from certain clones and seedling families in Java and Sumatra. Yields of clone Tjir 1 were disappointing. The best yields were given by clones LCB 1320 and PR 107, while the average yield of their seedlings was only slightly lower. Yields decreased after the 12th or 13th year, except in the case of PR 107.

2230. Paardekooper, E. C.
Heveazaailingen als plantmateriaal. **(Hevea seedlings as planting material.)** [English and Indonesian summaries ½ p. each.]
Bergcultures, 1955, **24**: 433-8.

The properties of legitimate, near legitimate and illegitimate seedlings are discussed. Results of hand pollination experiments suggest that the seedling families BR 2 × PR 107 and Tjir 1 × Tjir 16 are not generally satisfactory. Highest yields were obtained with seed collected along the lines of contact of blocks of Tjir 1, PR 107 and LCB 1320. Good yields were also obtained from combinations of one of these clones with Djas 1, Pat 190, War 4, and Pilm B 84. Selfed seed collected from the middle of large monoclonal blocks can be recommended only in the case of Tjir 1 and LCB 1320.—Proefstat. C.P.V., Bogor.

2231. Liefstingh, G.
Resultaten van drie rubbertoetsproeven. **(Results of three rubber trials.)** [English and Indonesian summaries ¼ p. each.]
Bergcultures, 1955, **24**: 438-47, illus.
In trials with new rubber clones under 3 different conditions of soil and climate, PR 107 was used as a control. The clones WR 101, GT 1 and AV 470 gave better yields than PR 107 and also possessed good secondary characters.—Proefstat. C.P.V., Bogor.

2232. Wiersum, L. K.
Observations on the rooting of hevea cuttings. [Indonesian and Dutch summaries 1 p. each.]
Arch. Rubb. Cult., 1955, **32**: 213-43, bibl. 13, illus.
An account is given of experiments on the rooting of "juvenile" cuttings from young seedlings and of "mature" cuttings from full-grown seedling trees or young or old budded plants [see also *H.A.*, 26: 1176]. In juvenile cuttings the percentage rooting decreases as the age of the parent plant increases, and cuttings taken from the base of the stem retain their rooting capacity longer than those from other parts. Many juvenile cuttings can be obtained from a single parent plant by stumping a young seedling at regular intervals, and by using the stems of young established cuttings of the first and even the second generation. With mature cuttings, or with cuttings from mature material "rejuvenated" by budding on or below the collar of young seedlings, no rooting was obtained.—Exp. Stat. C.P.V., Bogor.

2233. Rubber Research Institute of Malaya.
Planting density.
Plant. Bull. R.R.I.M., 1956, No. 22, pp. 14-17.
The effects of planting density were studied for two 8-year tapping cycles on AVROS 50 planted at 6 densities ranging from 50 to over 400 trees per acre and tapped on system S/2. d/2. 100%. The factors studied were rate of growth, minimum tapping age, virgin bark thickness, first and second bark renewal, d.r.c., yield and tapping costs. A formula for forecasting the most profitable stand per acre is presented.

2234. Compagnon, P.
Le diagnostic minéral et ses résultats pratiques. **(Mineral diagnosis and its practical results.)** [English summary 13 lines.]
Rev. gén. Caoutch., 1956, **33**: 9-11, bibl. 10, illus.
Mineral nutrition studies on hevea begun at the Institut des Recherches sur le Caoutchouc en Indochine in 1950 on N, P, K, Ca, Mg and the minor elements, especially Cu, Mn and Fe, have reached a point at which it is possible to determine from leaf and latex analyses the physiological state of a stand, its mineral deficiencies, if any, and their extent, and to prescribe curative fertilizer treatments. Examples are given of the successful diagnosis and treatment of major and minor element deficiencies.

2235. Young, H. E.
Report on an experiment in the control of *Oidium heveae* on rubber by aerial spraying.
Quart. Circ. Ceylon Rubb. Res. Inst., 1955, **31**: 56-63.
The reported trial provided useful information but; under the conditions prevailing, oidium control by spraying from the air with lime sulphur or wettable sulphur was less satisfactory and more expensive than dusting with sulphur from the ground.

2236. Young, H. E.
A review of the present status of *Phytophthora* leaf fall of hevea in Ceylon.
Quart. Circ. Ceylon Rubb. Res. Inst., 1955, **31**: 64-9.
Leaf fall of hevea caused by *Phytophthora palmivora* has been present in Ceylon for many years but until recently has not reached any great degree of importance. It is considered that: (1) The necessity for prevention on most estates is still doubtful at present, owing to lack of evidence of adverse economic effects on rubber yields. (2) Prevention with present fungicides without further knowledge may adversely affect the market quality of the rubber produced. (3) Dusting at 16 lb. per acre with at least a 6% copper oxychloride dust or with a 2% dithiocarbamate dust as soon as possible after the start of the south-west monsoon, and again one and two months later, would be worth trial by estates experiencing damage.

2237. Liefstingh-Hardick, F. B.
Mijtbestrijding in hevea-kwekerijen. **(Mite control in hevea nurseries.)** [English and Indonesian summaries 13 and 16 lines respectively.]
Bergcultures, 1955, **24**: 527-33, bibl. 9, illus.
In trials to control yellow mite (*Tarsonemus translucens*), emulsified solutions of endrin at 0·01% active ingredient proved to be the most efficient of the acaricides tested. Heavy mite infestations were controlled by one application.—Proefstat. C.P.V., Bogor.

2238. Rubber Research Institute of Malaya.
Tapping prior to replanting.
Plant. Bull. R.R.I.M., 1956, No. 22, pp. 11-13, illus.
High-intensity tapping systems combined with periodical stimulant application [see *H.A.*, 25: 2200] were practised on 5 estates on a commercial scale for 11 months. In every instance the old trees had been tapped on half circumference alternate daily 100%. Prior to intensive tapping, they were then tapped high on a half circumference cut at 100% intensity, with a yield stimulant applied at six-monthly intervals. During the final year of life the recommended systems of intensive tapping were adopted, with two cuts on the virgin bark, and one, or if possible two, cuts on the renewed bark. All cuts were tapped on the same day, and the intensity was maintained at 200%. To maintain this intensity, when three cuts were employed tapping was third daily, and when four cuts were employed fourth daily. When possible the two cuts in the virgin bark were tapped in an upward direction, but, if this was not practicable because of previous ladder tapping, the original ladder-tapped cut was

continued downwards, and the new cut upwards. A yield stimulant was applied at four-monthly intervals to the high cuts only. On two estates very good results were obtained by using one upward cut at 100% intensity prior to more intensive tapping. In upward tapping it has been found that the arms of the V-cut should be steeper than 35° from the horizontal. Details of the yields are given. Mean yields expressed as a percentage of pretreatment yields (100%) ranged from 129 to 272% and were more than double in 6 cases out of 10. A scale diagram and photograph of a new knife especially suitable for upward tapping are presented.

2239. WIERSUM, L. K.
Physiological investigations into the process of yield stimulation of latex. [Indonesian and Dutch summaries 1 p. each.]
Arch. Rubb. Cult., 1955, **32**: 245-78, bibl. 30, illus.

Yield stimulation by the application of growth substances was studied in girdled trees, in pollarded trees and in comparison with intensified tapping. It is concluded that: (1) The local application of growth substances induces in the surrounding tissues increased respiration, which causes increases in the intake of water and solutes, in the outflow of latex and in cell metabolic activity. (2) The much higher metabolic activity accelerates the regeneration of the protoplasmic contents of the latex vessels and the rate at which the amount of rubber is restored to the normal level. (3) No exhaustion of local reserves need occur since growth substances can also induce an intensified supply of soluble metabolites to the area of application. (4) The increased consumption of assimilable products derived from the leaves retards the growth of the tree as a whole, especially girth expansion. (5) Applied to a full-grown stand yield stimulation results in a more favourable balance between the production of rubber and of wood, and if the trees are kept healthy exhaustion may largely be prevented, even if stimulation continues for a number of years.—Exp. Stat. C.P.V., Bogor. [For earlier papers see *H.A.*, 24: 1017x and 3190, 25: 4406 and 26: 1235w].

2240. MESSENGER, T. H.
Rubber.
Reps Progr. appl. Chem., 1954, **39**: 413-31, bibl. 184.

This paper is mainly devoted to synthetic rubber and processing but it discusses natural rubber briefly under the headings: plantation chemistry and latex chemistry.

2241. SCHOON, T. G. F., AND VAN DER BIE, G. J.
Particle size distribution in brominated hevea latices. [Indonesian and Dutch summaries ½ p. each.]
J. Polymer Sci., 1955, Vol. **16**, reprinted in *Arch. Rubb. Cult.*, 1955, **32**: 329-57, bibl. 16, illus.

Electron micrograph studies of clonal latices and centrifuge fractions showed that clonal variations occur in particle size distribution. It is suggested that particle size distribution may have an influence on the centrifuging qualities of a latex.

2242. RISDON, E. J., MUTHUKUDA, D. S., AND VEERABANGSA, M. T.
The determination of the dry rubber content of natural rubber latex. Part III. Methods for fresh latex with special reference to the use of the metrolac.
RISDON, E. J., AND OTHERS.
Ibid. Part IV. Use of the total solids determination.
Quart. Circ. Ceylon Rubb. Res. Inst., 1955, **31**: 34-49, bibl. 12, and 50-5, bibl. 5.

Part III. This paper deals primarily with the use and abuse of the metrolac under normal estate conditions and is intended to remind users that the metrolac is not, and was probably never expected to be, an accurate instrument. Using experimental data obtained with the metrolac, an attempt has been made to illustrate some of the conditions where the metrolac probably can and cannot be employed with reasonable confidence.

Part IV. Following a suggestion that certain latex buyers in Ceylon tentatively contemplated the calculation of the % d.r.c. of incoming deliveries of latex using (a) the % total solids figure, which is more rapidly obtained experimentally than the % d.r.c., and (b) a relationship of the type, % d.r.c. = K (the quotient of purity) × % total solids, various tests have been made to determine how far K is likely to be independent of the original "normal" latex and of daily variation in the latex, etc. The tests suggest that without a considerable volume of preliminary data on the latex systems involved any attempt to obtain an accurate estimate of the daily % d.r.c. cannot necessarily be accepted with complete confidence. [Authors' summaries.] [For Parts I and II see *H.A.*, 23: 3588.]

2243. COOK, A. S., AND SEKAR, K. C.
Volatile acids and the quality of concentrated natural latex.
J. Rubb. Res. Inst. Malaya, 1955, **14**: 407-22, bibl. 13, being *Commun.* **297**.

A simplified procedure for determining volatile fatty acids in ammoniated latex is presented. Specific conductivity can be used to indicate an approximate value of VFA number. Volatile acids can be formed in field latex before and after ammoniating, the extent depending on a number of factors including time of ammoniation, amount of ammonia added and period of storage. A small amount of formaldehyde added before ammoniation delays the development of volatile acids. The VFA No. of a 60% d.r.c. concentrate lies between one third and one half of the VFA No. of the field latex from which it is prepared, and it is shown that the presence of moderate and high concentrations of volatile acids in the concentrate is associated with inhibition of the normal increase in mechanical stability on storage. Low grade concentrate can be purified by recentrifuging and its mechanical stability increased. [Authors' summary.]

2244. ARCHER, B. L., AND SEKHAR, B. C.
The proteins of *Hevea brasiliensis* latex. 1. Protein constituents of fresh latex serum.
Biochem. J., 1955, **61**: 503-8, bibl. 13.

The aqueous serum phase of unpreserved hevea latex

was separated in 2 ways: (a) by high-speed centrifuging, and (b) by prolonged freezing at −25° C. The protein contents of the serum solids were approximately 18% and 13% respectively. In both types of serum 7 electrophoretically distinct protein components were detected. After treatment with dilute ammonia solution for 15 days only 2 of the original protein components were readily resolvable electrophoretically. [From authors' summary.]—British Rubber Prod. Res. Ass., Welwyn Gdn City, Herts., and Rubber Res. Inst. Malaya, Kuala Lumpur.

2245. Archer, B. L., and Cockbain, E. G.
The proteins of *Hevea brasiliensis* latex. 2. Isolation of the α-globulin of fresh latex serum.
Biochem. J., 1955, **61**: 508-12, bibl. 5.

One of the 2 major protein components of fresh hevea latex serum was isolated by an isoelectric precipitation method, and the optimum conditions for precipitation were determined. A preliminary examination was made of the purified protein. Analytical and solubility data indicate that it is a globulin lacking non-protein prosthetic group. [From authors' summary.]—British Rubber Prod. Res. Ass., Welwyn Gdn City, Herts.

Sugar cane.

(*See also* 1293, 1350, 1658-1663, 2150, 2152, 2305g, l-n, w, y, 2306l, o, p, s, u, v, 2340h.)

2246. Hawaiian Sugar Planters' Association.
Report of the Experiment Station Committee for the year ending September 30, 1955, pp. 66, illus.

A brief, semi-popular account is given of many lines of work, including: *By-products:* paper and corrugated board, wax, fatty acids, ceryl alcohols and sterols, cement-bagasse. *Cultural practices:* Fertilization (aqua ammonia, soil reserves, trace element deficiencies, crop logging, nitrogen and aerial application), tillage, irrigation, rat destruction from the air. *Diseases:* Resistance trials of Hawaiian varieties in Fiji, diseases in Hawaii, PMA treatment of setts for increasing germination and minimizing losses from pineapple disease, soil fumigation. *Factory:* Comparison of milling of cane harvested by pushrake and by cutter-windrower. *Insects:* investigations on beetle borer (*Rhabdoscelus*), armyworms, mealybugs, insect trapping, use of systemic insecticides in water culture experiments. *Interdepartmental studies:* Varietal yield decline, harvesting experiments including cost reduction and quality determination by the pol ratio method. *Mechanization:* Cut-and-load harvesting, cutter-windrower, cutter-windrower-transport, pickup reel for harvesters, cross-flow cutter, irrigation flumes, outlets and rubber tubing, flume pickup machine. *Varieties:* Breeding, testing, the 1955 varietal position, flowering control. *Water development. Weather:* Including artificial rain research. *Weed control.* [See also separate abstracts below and under Weeds.]

2247. Indian Council of Agricultural Research.
Special sugarcane supplement.
Suppl. Indian Fmg, [1956?], pp. 68, illus.

A general article by P. P. Chandra describes the progress made under the Five-year Sugarcane Development Scheme started in India in 1948/49 and recently extended for a further 3 years. Under the Scheme setts and manures have been distributed, irrigation facilities improved and a watch and ward service maintained against diseases and pests. A soil survey is in progress. Comparative figures for 1948/49 and 1954/55 show that there have been notable increases in yield per acre in each of the main producing states. Other articles deal with research at Coimbatore, Lucknow and elsewhere, quality in cane and developments in cultural methods including mechanization.

2248. Queensland.
Fifty-fifth Annual Report of the Bureau of Sugar Experiment Stations 1954/55, Brisbane, 1955, pp. 95, illus.

The subjects covered include yield losses in different varieties due to ratoon stunting disease, fertilizer trials, molasses and bagasse as soil amendments, molasses-bagasse mixtures as stock feeds, trash disposal experiments, wax investigations, possible insect transmission of chlorotic streak and ratoon stunting diseases, control of *Mimosa invisa* and *Echinochloa crus-galli*, MH for nutgrass control [see separate abstract], and cane breeding expansion.

2249. King, N. J.
Erect varieties for better profits.
Buzacott, J. H.
Progress in the development of varieties for rich land.
Cane Grs' quart. Bull., 1956, **19**: 83-4, illus., and 84-5.

Cyclones and heavy, unseasonable rain resulted in much lodging in Queensland in 1954 and 1955 and have drawn attention to the need for lodging-resistant varieties. Q.57, now on the approved list in some areas, has shown a remarkable ability to remain erect in heavy crops, even when the soil is rendered soft by continued rain. Two unreleased canes, I.233 and K.641, are also lodging-resistant. The second paper discusses the problem of lodging and low sugar content which occurs over a considerable acreage in North Queensland. For rich lands a variety should be of erect habit, not too vigorous, preferably with medium to thick stalks, not prone to sucker and with a high sugar content early in the season. The two unreleased canes mentioned above and two others, K.658 and K.696, are all erect varieties which show promise for rich, low-lying land.

2250. Monjes, P. H.
Descripción botánica y comportamiento cultural de nuevas variedades de caña de azúcar. **(Botanical descriptions and cultural performance of new sugar cane varieties.)**
Rev. industr. agríc. Tucumán, January–December 1953/54 to January–September 1955 (issued 1955), **39**: 16-21, illus.

Information is given on 7 C.P. varieties, C.B.33/47 and M.275, which have been imported into Argentina since 1946 for testing at Tucumán Agricultural Experimental Station.

2251. Barreto, R.
Estudios comparativos con nuevas variedades realizados por la Estación Experimental de la Caña de Azúcar de Jovellanos. **(Variety trials at the Jovellanos Sugar Cane Experiment Station.)**
Mem. XXVIII Conf. anu. Asoc. Téc. azuc. Cuba, 1954, pp. 9-19, bibl. 2.

The results are given of plant cane trials of 25 different varieties, mainly Cuban, harvested at 4 centres in 1954. The highest sugar yields were given by B.37161, B.34104, H.37-1933 and C.499-48.

2252. Loh, C. S., and Tseng, P. M.
Three promising varieties of sugarcane newly bred in Taiwan.
J. agric. Ass. China, 1955, **11**: 46-83, bibl. 4, illus.

Information is given on the characters and performance of P.T. 50-62, P.T. 50-2 and P.T. 51-11.

2253. Guilbeau, W. F., Coll, E. E., and Martin, L. F.
Processing characteristics of sugar cane varieties grown in 1954.
Sugar J., 1955, **18**(6): 26-9, bibl. 6.

Of 4 unreleased or recently released varieties tested against the standard C.P. 44-101, C.P. 48-103 was the best, having a very high sucrose content, the best clarity and the lowest quantity of mud in processing.—S. reg. Res. Lab., New Orleans.

2254. Fors, A. L.
Los efectos de fungicidas orgánicos sobre las semillas de caña de azúcar. **(The effects of organic fungicides on sugar cane setts.)**
Mem. XXVIII Conf. anu. Asoc. Téc. azuc. Cuba, 1954, pp. 51-3.

The results are given of tests made in 1952 on the effect of 5-minute dips in 7·5% ammonium phenyl mercuric triethanol lactate or 75% thiram on setts of Pepe Cuca and ML 3-18, in which germination is rapid and slow respectively. The chief conclusions were: (1) The fungicide dips are of particular value when setts are to be planted in poorly drained soil, especially with slow-germinating varieties. (2) Mercurials are better than non-mercurials. (3) Treatment advances germination, and increases the percentage germination and the proportion of shoots per sett. (4) Treatment increases cane yield significantly but has no significant effect on sugar percentage.

2255. Khanna, K. L., Sharma, S. L., and Ramanathan, K. R.
Studies in the anatomy of sugarcane stalk. V. Pith and cavity development.
Proc. Indian Acad. Sci. Sect. B, 1955, **42**: 195-208, bibl. 26, illus.

Pith and cavity are undesirable features, the presence of which causes reduction in weight and juice quality in standing cane and accelerates deterioration in cut cane. A precise method for the estimation of their magnitude is given. The estimate so made was found to be closely correlated with the number of internodes having pith and cavity, the correlation coefficients for Co.313, Co.331 and Co.513 being +0·7355, +0·8675 and +0·8710 respectively. Co.331 and Co.513 were, respectively, the greatest and the least cavity-forming varieties among those studied. Arrowing always produced pith in upper internodes even in solid-cored varieties.—Centr. Sugarcane Res. Stat., Pusa, Bihar.

2256. Rao, M. S. S., and Lal, K. N.
Development of assimilating surface in relation to leaf indices and dry matter accumulation.
Proc. Indian Acad. Sci., Sect. B, 1955, **42**: 258-82, bibl. 29, illus.

Studies showed that in sugar cane and other graminaceous plants leaf area is related (1) to leaf length and leaf width in the middle of the blade; and (2) to leaf dry weight and plant dry weight. The equations expressing these relationships are presented.—Coll. Agric., Banaras Hindu Univ.

2257. Capó, B. G., and others.
The method of foliar diagnosis as applied to sugarcane. [Spanish summary 1½ pp.]
Bull. P.R. agric. Exp. Stat. Rio Piedras **123**, 1955, pp. 47, bibl. 6, illus.

Detailed procedures based on the results of experiments at the Station are presented for the sampling of cane fields, the handling and analysis of leaf samples and the interpretation and use for commercial fertilizer practice of the results of the analyses. The 4th, 5th and 6th leaf blades and their sheaths are used as a sample, counting the unrolled to half-opened spindle leaf as number one. A section is devoted to the interpretation of special conditions which may influence foliar-diagnosis values and their use for fertilizer recommendations, namely, (a) low leaf-nutrient and low sheath-moisture values with poor cane growth, (b) severe imbalance of leaf-nutrient values, and (c) low leaf-N and sheath-moisture values due to lack of moisture.

2258. Samuels, G.
Influence of fertilizers on the components of available sucrose-percent-cane. [Spanish summary ½ p.]
J. Agric. Univ. Puerto Rico, 1955, **39**: 84-91, bibl. 2.

Using data from experiments where fertilizers had significantly influenced available sucrose-percent-cane yields, the influence of the fertilizers on the various components of sugar in sugar-cane were found to be as follows: (1) When sufficient K was present, N applications increased polarization and degree-Brix very significantly, and percent-extraction to a lesser degree. (2) A deficiency of P significantly decreased sucrose both in juice and in cane, as well as purity. (3) K deficiencies produced highly significant reductions in available sugar in juice and cane, polarization, Brix, and purity. Percent-extraction was not significantly influenced by use of K fertilizers. (4) The relative responses to the fertilizer treatments were highest for available sugar in both juice and cane, and in polarization, with degree-Brix following. Percent-extraction showed the lowest relative response to the use of fertilizer. [From author's summary.]

2259. Burr, G. O.
Plant analyses as indexes of nutrient availability and adequacy.
Hawaii. Plant. Rec., 1955, **55**: 103-9.

Analyses of plant parts after the field application of N

P, K and Ca at various levels showed that stalk content, in particular that of the 8th–10th internodes, is a reliable index of nutrient availability and adequacy. It was found that the P and K contents of the 8th–10th internodes fell greatly when N was applied to the soil, and that for every lb. N applied about 1⅓ lb. each of K_2O and P_2O_5 must be applied to hold the K and P contents at the 8th–10th internodes constant.—Exp. Stat., Hawaii. Sugar Planters' Ass.

2260. Ayres, A. S., and Hagihara, H. H.
Soil analyses as indexes of nutrient availability.
Hawaii. Plant. Rec., 1955, **55**: 113-25, bibl. 13.

Among the subjects discussed is the effect of cropping with sugar cane on the levels of soil P and K.—Exp. Stat., Hawaii. Sugar Planters' Ass.

2261. Humbert, R. P.
Nutrient balance in sugar cane nutrition.
Hawaii. Plant. Rec., 1955, **55**: 47-51, bibl. 4, illus.

The effects on yield of excessive liming, of Ca/K antagonism and of K/N interaction are briefly discussed.—Exp. Stat., Hawaii. Sugar Planters' Ass.

2262. Humbert, R. P., and Martin, J. P.
Nutritional deficiency symptoms in sugar cane.
Hawaii. Plant. Rec., 1955, **55**: 95-101.

Deficiency symptoms [which are described] of N, P, K, Ca, Mg, Fe, Mn and B were developed in nutrient solutions for the commercial varieties 32-8560, 37-1933, 38-2915 and 44-3098. Chemical analyses of leaf blade, leaf sheath, immature stalk and mature stalk samples are presented to show composition at deficiency levels of nutrition. Comparison of the analyses of normal and subnormal field samples with these data should give leads to maintain a satisfactory nutrient balance. The effects of nutrition on the incidence of major diseases of sugar cane in Hawaii are discussed. [Authors' summary.]—Exp. Stat., Hawaii. Sugar Planters' Ass.

2263. Innes, R. F., and Chinloy, T.
Experiences with crop control in Jamaica.
Hawaii. Plant. Rec., 1955, **55**: 149-59.

The control of the nutrition of sugar cane in Jamaica is discussed with reference to field experimentation and the derivation of a complementary advisory procedure based upon the composition of an index tissue. Fertilization is based upon results from a network of factorial experiments in continuous operation. Critical or limiting values for leaf N are of significance but must be interpreted with caution. Leaf N cannot as yet be used to predict quantitative responses to N. A method of N control based upon the response of the leaf N to N applied during the first four months of growth is of value on irrigated estates in assessing N applications already made. The behaviour of leaf P in relation to standard dressings of superphosphate, as influenced by the level of P in the leaf in the absence of P dressings, is defined. It has been possible to establish a limiting or critical value for leaf P and to derive a relationship of fair accuracy between P in leaf lamina material and the quantitative response to a standard dressing of superphosphate as measured by sugar per acre. The relation between the increased K status of lamina dry matter as a result of applying standard dressings of muriate of potash has been shown to be a function of the level of K in the leaf in the absence of K manuring. The relative increase in sugar per acre from a standard dressing of muriate of potash is quantitatively related to the K content of the leaf lamina with sufficient accuracy not only to justify a limiting or critical value of leaf K, but also to predict economic K dressings. [From authors' summary.]—Sugar Manufrs' Ass. of (Jamaica) Ltd., Mandeville.

2264. Burr, G. O., and Takahashi, D.
Absorption and distribution of nutrients in sugar cane. Part I: Nitrogen.
Burr, G. O., and Tanimoto, T.
Ibid. Part II: Potassium.
Hawaii. Plant. Rec., 1955, **55**: 3-10, bibl. 1, and 11-13.

An account is given of experiments made to determine (1) the response of the different parts of the sugar cane plant to different nutrient levels; (2) the effect of temperature upon rate of uptake and final distribution of nutrients; and (3) the effects of age on composition. Investigations with ammonia and urea tagged with N^{15} and with the alcohol-soluble fraction, which was found to represent the mobile N, led to the conclusion that in the plant N is in a state of flux, being moved in a general circulatory system to all parts of the stool and old N being exchanged for new in every tissue. The analysis of any single part of the plant cannot give a clear picture of the N situation since the concentrations in the different parts are changed in relation to one another by temperature, age, N supply and other factors. It may well be that the ultimate solution to the problems of foliar diagnosis will be found through intra-plant gradients rather than by the analysis of any one tissue. In K studies plants were grown in culture solutions with ample and deficient supplies of the element. Analysis showed that the well-supplied plants contained 3 times as much K as the deficient ones, old cane and roots suffering the greatest depletion while young tissues maintained almost the full concentration.—Exp. Stat., Hawaii. Sugar Planters' Ass.

2265. Clements, H. F.
The absorption and distribution of phosphorus in the sugar cane plant.
Hawaii. Plant. Rec., 1955, **55**: 17-32.

A brief account is given of the research leading to the selection of the young leaf sheath as a suitable P-Index tissue and to the determination of 0·080 as the Standard P-Index. On the basis of this SPI, which is the P contents of the young sheaths expressed on a sugar-free dry weight basis, recommendations are made for the phosphate fertilization of plant and ratoon cane. Recommendations are also made on the forms of phosphate to be used on different Hawaiian soils.—Hawaii agric. Exp. Stat.

2266. Hartt, C. E.
The phosphorus nutrition of sugar cane.
Hawaii. Plant. Rec., 1955, **55**: 33-45, bibl. 4.

An account is given of investigations on the absorption and distribution of P. Studies with radioactive P illustrated the rapidity with which the element is absorbed and distributed, and suggested foliar application as a means of overcoming deficiency. Experi-

ments on absorption showed: (1) Low root temperatures affect absorption of P and growth of the plant to about the same extent, resulting in nearly uniform percentages of P in the plant. (2) Plants of the same size absorbed P from nutrient solutions at the same initial rates, regardless of the amount in the nutrient solution. (3) Reducing the P in the nutrient solution to 25% of basic and allowing it to run out between renewals decreased the absorption rate of P to 35% of basic. Inorganic P in the 7th blade of these plants was 56% of basic, while organic P was 85% of basic. (4) K deficiency in the nutrient solution caused an increase in absorption of P by the blades. This was particularly apparent with respect to inorganic P. Other tests concerned the distribution of P in plants supplied with high, basic and low P, and the forms in which P is found in the plant. The best indicator tissue so far found is the stem. Internodes 8–10 were used in the studies described and total P is the determination selected for general use.—Exp. Stat., Hawaii. Sugar Planters' Ass.

2267. Hauck, F. W.
El probema del empleo racional de los fertilizantes potásicos en el cultivo de la caña de azúcar. **(The problem of the proper use of potassium fertilizers in sugar cane growing.)**
Mem. XXVIII Conf. anu. Asoc. Téc. azuc. Cuba, 1954, pp. 21-30, bibl. 12.

Examples of K analyses of sugar cane soils and leaves in different parts of the world are given together with the results of a potassium fertilizer experiment in Formosa. In this experiment N and P_2O_5 were applied at fixed rates of 160 and 100 kg. per ha. respectively and the percentage yield increases given by 100, 150 and 200 kg. K_2O compared with no K were 48, 90 and 117 respectively. It is tentatively suggested that the critical K_2O contents below which potassic fertilization is necessary are 100–180 p.p.m. in the soil and 1·3–2·3% D.M. in the leaves. Fertilizer requirements lie between 100 and 400 kg. K_2O per ha., 200 kg. being about the optimum in Formosa.

2268. Toohey, C. L.
Two useful grubber adaptations.
Cane Grs' quart. Bull., 1956, **19**: 80-1, illus.

In the first a wire mesh basket for carrying roots, rocks and debris is fitted to the top of an ordinary rigid-tine grubber. In the second two sub-frames carrying standard spring-tines are fitted to the normal cultivator frame. By means of an adjustable arch on the sub-frames it is possible to obtain high clearance and thus continue to use the normal spring-tines on relatively old cane. Both tines and sub-frames are adjustable to suit any row spacing and no difficulty is experienced in working close to the stools. Two standard fertilizer hoppers complete the implement.

2269. Peereboom, N. J.
Waterlootvorming bij het suikerriet. **(The growth of watershoots in sugar cane.)**
Maandber. Proefstat. Java-Suikerindustr., 1955, **11**: 317-28, from abstr. in *Trop. Abstr.*, 1956, **11**, No. d106.

Removing late suckers by pruning is comparatively expensive. Other methods of limitation or elimination are suggested.

2270. Hawaiian Sugar Planters' Association.
Practical control of tasseling in the offing. Flower control by drought and by chemical sprays.
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1954/55, pp. 44-6.

In certain regions of Hawaii withdrawing irrigation water seems to be the most promising method of controlling flowering, while in other regions of high water table and high rainfall control by sprayed chemicals has reached the stage of economic practicability. Success depends upon two properties of the sugar cane plant: first, a very narrow time interval during which flower initiation takes place; and secondly, no tendency to flower again for a year, once the flower initiation has been suppressed. The results of investigations were: (1) The date on which the first flower buds became visible under a hand lens was the same for all varieties in all locations (September 20–23). (2) All varieties initiated at the same time. (3) By selecting large stalks, as much as 100% flowering was observed, even in varieties often considered moderate or low-flowering types. Of all the chemicals studied CMU, maleic hydrazide and Versene showed the most promise for controlling flowering economically. A detailed study on timing the withdrawal of irrigation water has supported earlier conclusions that water should not be applied between August 10 and September 21. All plots were subjected to the same total drought period of seven weeks. A shift of 10 days in the time of drought made the difference between poor control and perfect control. Resuming irrigation as early as September 17 resulted in as much as 20% arrowing.

2271. Escobar Orozco, O. M.
Autoincompatibilidad en la variedad de caña de azúcar Mayaguez 336. **(Self-sterility in the sugar cane variety Mayaguez 336.)**
[English summary 8 lines.]
Acta agron. Palmira, 1955, **5**: 135-46, illus.

In experiments on the effect of growth-inhibiting substances on pollination and fertilization in sugar cane, Mayaguez 336 failed to produce viable seeds from self-pollination or fraternal crosses. Investigation showed that the ovules and pollen are fertile but that the variety is self-sterile. This is believed to be the first record of self-sterility in sugar cane.

2272. Smith, N. M., and Rehbein, C. A.
Flood damage in the Maryborough area.
Cane Grs' quart. Bull., 1956, **19**: 94-9, illus.

In March 1955 some Queensland cane lands were submerged to depths of up to 30 feet for 3–4 days. The damage resembled that caused by very severe frosting. No green leaf remained and during the first fortnight after submersion the collapse of leaves from the sheath became well advanced and decomposition of the stalk progressed to the first node below the topmost point of damage. The varieties which in general were the least severely affected were N.Co.310, Q.47, Q.50 and Q.28. C.c.s. figures for flood-damaged cane are given for a number of varieties. Conclusions drawn were that no variety was able to withstand prolonged inundation with silt-laden water, and that where a thick deposit of silt occurred, which remained too wet and heavy to cultivate, the stool invariably

rotted. Where cultivation was possible, and the destroyed crop was removed, the stool stood a good chance of survival.

2273. Hughes, C. G., and Steindl, D. R. L.
Ratoon stunting disease of sugar cane.
Tech. Commun. Qd Bur. Sugar Exp. Stats. **2**, 1955, pp. 54, bibl. 63, illus.

The chief subjects covered are the distribution of the disease in Queensland, its symptoms, including stunting and yield reduction in plant cane and ratoon crops, and varietal reaction, transmission, the causal agent and control by the use of healthy planting material and by hot water and hot air treatment. The results are summarized of a number of trials in which the yields and c.c.s. were compared for diseased and apparently healthy planting material.

2274. Hawaiian Sugar Planters' Association.
Ratoon stunting disease undergoes intensive study.
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1954/55, pp. 19-20.

In a test on 4 varieties, including 3 standards (37-1933, 38-2915 and 44-3098), grown from cuttings inoculated with juice from diseased canes, no sugar losses were recorded in the plant cane crop. In a test on 2 varieties to study the effectiveness of long hot-water treatment (50° C. for 2 hours), differences in sugar yield from diseased and diseased-treated cuttings were not significant with one variety but the treatment was markedly beneficial with the other.

2275. Singh, K.
***Phytophthora* rot of sugarcane.**
Diss. Abstr., 1955, **15**: 1486, being *Publ.* 12529 of 147 pp.

In Louisiana two phycomycetes were frequently isolated from ungerminated sugar cane setts. One was identified as *Phytophthora erythroseptica*, the other was not identified. Experimental results indicated that in cool and wet winters widespread stand failures of sugar cane, attributable to *Phytophthora* rot, may be expected.

2276. Lauden, L. L.
Chlordane.
Sugar Bull., Sept. 15, 1955, reprinted in *Sugar J.*, 1955, **18**(6): 25.

In tests in Louisiana on heavy soil 2 lb. technical chlordane per acre, applied either as a spray or as a dust to setts in the open furrow, gave an average increase of 2·5–2·8 tons plant cane per acre and, by residual action, a similar increase in first ratoon yield. The recommended dusting rate is 100 lb. 2% dust per acre. Treatment is not generally recommended on light soils. The total costs of the chlordane treatment were $4.50 per acre, and the average annual gain from increased yields was $16–18 per acre.

2277. Hawaiian Sugar Planters' Association.
Systemic insecticide useful in water culture experiments.
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1954/55, p. 26.

In glasshouse experiments sugar cane grown in water cultures is sometimes so heavily infested by leaf mites (*Oligonychus indicus*) and cane aphids as to invalidate experimental results. The addition of octamethyl pyrophosphoramide at 1 : 6,400 to the nutrient solution killed the aphids in a few days and the mites in about 2 weeks. Stronger doses were effective sooner, and even 1 : 100 did not visibly injure 37-1933.

2278. Barreto, R.
Perdidas de sacarosa en cañas de azúcar dañadas por el borer, *Diatraea saccharalis* Fab. **(Sucrose losses in cane infested with *Diatraea saccharalis*.)**
Mem. XXVIII Conf. anu. Asoc. Téc. azuc. Cuba, 1954, pp. 35-9, bibl. 1.

An investigation at the Jovellanos Sugar Cane Experiment Station in 1953 and 1954 showed that each 1% infestation results in a 0·02329% reduction in available sucrose.

2279. Agarwala, S. B. D.
Control of sugarcane termites (1946–1953).
J. econ. Ent., 1955, **48**: 533-7, bibl. 1.

Field observations showed that termites (*Microtermes obesi*) need damp, but not waterlogged, soil conditions. Normal irrigation practice did not control them. The sets were attacked equally at the cut ends and the nodal annulus. In field trials insecticides were applied to the setts either as a pre-planting dip, or to cut ends, or were sprinkled over them in the furrow before covering. Aldrin and dieldrin proved to be the best materials for persistent and almost complete protection of sugar cane from termites [see also *H.A.*, 25: 1104]. They could be applied with success to all stages of the sugar cane crop.—Centr. Sugar cane Res. Stat., Pusa, Bihar.

2280. Williams, T.
Loading cane.
Rev. agric. sucr. Maurice, 1955, **34**: 192-6, illus.

Tests have shown that loading lorries by means of mobile cranes is by far the most efficient method of cane loading under Mauritian conditions. The method is described.

2281. B, W.
Recent developments in mechanised field and siding loading.
S. Afr. Sugar J., 1955, **39**: 807, 809, illus.

An illustrated description is given of a mobile crane which loads the full length of a railway truck at each lift, and of a trailer 30 feet long which has a capacity of 5–6 tons of cane.

2282. Hawaiian Sugar Planters' Association.
Determining cane quality by the new pol ratio method.
A.R. Hawaiian Sugar Plant. Ass. Exp. Stat. 1954/55, p. 32.

The recent development of the silage cutter-disintegrator method provides for the first time a workable procedure for determining pol and fibre % cane. Prior to this development the quality of cane from experimental plots could be appraised only on the basis of juice analyses. Under the new procedure a representative sample of 400 lb. or more is drawn from each plot as it is harvested and delivered to the silage cutter for chopping. By means of a deflector in the discharge spout, a continuous subsample is collected. Pol and fibre % cane

are determined by combining a known weight of cane sample (2 lb.) with a known amount of water, and subjecting the resulting slurry to comminution and diffusion in the disintegrator to bring the sugar in the cane tissue into equilibrium with the surrounding liquid. Pol % cane can then be calculated from an analysis of the dilute juice. Fibre % cane is determined by washing the fibre until it is free of soluble solids and drying it to constant weight.

Tea.

2283. Engledow, F. L., and others.
Report of the Commission of Enquiry on the Scientific Department, Indian Tea Association.
London and Calcutta, 1954, pp. 162, illus., from summary in *Mem. Univ. Cambridge Sch. Agric.* **27**, 1956, p. 12.

Subjects covered include the need for reducing production costs without lowering quality, the closer definition of the soil-climate regions of the tea area, the problems of soil fertility maintenance and of shade, clonal studies and manufacture.

2284. Indian Tea Association, Tocklai.
Annual Report of the Indian Tea Association, Scientific Department, Tocklai Experiment Station, for 1954, 1955, pp. 150.

In addition to sectional reports abstracted below the following work* may be mentioned: *Biochemical Branch.* Fundamental research: volatile constituents; chemical changes in withering and maturing. Manufacture. *Tasting Branch. Physico-chemical Branch.* Soil and climate studies. *Entomological Branch.* Control of termites and red spider; taints from insecticides. *Mycological Branch.* Control of black rot, red rust and eelworms; *Nectria* inoculation experiments. *Engineering Department.* Tunnel withering, rolling and harvesting equipment. *Advisory Branch.* Trials on manuring and green manures, shading, pruning, plucking, vegetative propagation, spraying and herbicides.

2285. van der Knaap, W. P.
Results of tea clone experiments at Pasir Saronggé. [Indonesian and Dutch summaries.]
Arch. Theecult., 1955, **19**: 47-98, bibl. 19, illus.
Gegevens van veredeld theeplantmateriaal. **(Data on tea clones.)**
Bergcultures, 1956, **25**: 35-7, bibl. 3.

Selection of 15 tea clones has been made on the basis of yield and blister blight resistance. Frame development of most of the clones was less than that of seedlings. Tea quality was considered less important than blister blight resistance, as the plants are used for gapping and not for large-scale plantings.

2286. Indian Tea Association, Tocklai.
Effect of desiccation and seed dressings on germination of tea seeds and the resulting plants.
A.R. Indian Tea Ass., sci. Dep., Tocklai, 1954, 1955, pp. 116-20.

The chief conclusions drawn from an experiment at Borbhetta were: (1) Seed desiccation induced spiraling of the root and shoot near the cotyledons. (2) Agrosan GN hastened germination and, compared with Tillex, improved germination slightly and prolonged the viability of packed and unpacked seed.

2287. Snethlage, P., and Paardekooper, E. C.
Vegetatieve vermeerdering in de theecultuur. **(Vegetative propagation in tea growing.)** [English and Indonesian summaries 16 and 18 lines respectively.]
Bergcultures, 1956, **25**: 38-45, bibl. 6, illus.

Vegetative propagation of tea is slowly gaining ground. Budding is recommended for establishing budwood and seed gardens, and cuttings for large scale production. Budding methods and factors affecting union are discussed.

2288. Indian Tea Association, Tocklai.
Botanical branch.
A.R. Indian Tea Ass., sci. Dep., Tocklai, 1954, 1955, pp. 30-44.

Yield (Wight, W.). Data are presented for an experiment laid down in 1936 on 12 jats under *Albizzia* shade and N treatments. Analyses show that (1) the effect of N on net yield (=yield per unit area of real bush surface) was not modified by shade, and (2) the interactions observed in terms of bush yield (=yield of an individual or average bush supposing it to have sufficient space in which to develop) were apparently dependent on changes in bush area. *Light intensity and phenotypes* (Barua, D. N.). In an experiment on the effect of light intensity on the rate of assimilation and the partition of assimilates between the various organs, 4 clones covering almost the entire range of phenotypes now grown in northern India were used. Preliminary analyses show that: (1) The average linear rate of increment of dry matter with time of all the four clones is altered by a change in the intensity of incident light. (2) Clones differ in their linear time-rates of production of dry matter when these rates are the average of all the different light intensities. (3) There is a significant second order interaction of light and clone on the linear rate of increment of dry matter with time. From previous work at Cambridge with young seedlings grown under controlled environment, it was possible to suggest that light intensity above 30–35% of the full light in the tropics might not materially increase the capacity for the production of dry matter by young tea plants grown under natural conditions. Requirement of a higher light intensity for the maximum production of crop by mature, plucked tea bushes, as shown by field experiments, could be due to the mutual shading of the photosynthetically efficient mature leaves remaining below the plucking table. It still remains to be seen whether the light requirement for optimal production of dry matter by the tea plant differs from that required for the most efficient production of plucked shoots.

2289. Indian Tea Association, Tocklai.
Agricultural branch.
A.R. Indian Tea Ass., sci. Dep., Tocklai, 1954, 1955, pp. 9-29.

A summary follows of experiments on manuring and shading. *Phosphate application at planting time:* As little as ½ oz. superphosphate placed in the bottom of

the hole resulted in greater height and weight 2½ years later. *Nursery fertilization:* 1 : 2 : 3 NPK (N=2 lb. per acre) applied fortnightly for 6 months gave the best results, namely, 40% increase in height at 18 months compared with the unmanured controls. *Effect of PK with and without shade:* The chief results for 1949/53 of this experiment laid down in 1922, in which all plots including the control received 40 lb. N per acre, are: (1) Shade has resulted in a significantly greater yield than no-shade each year, irrespective of the level and combination of manures. (2) Compared with P_0K_0, $P_{45}K_{80}$ gave a mean yield increase over the 5 years of 0·85 maunds per acre [1 maund=82·3 lb.]. (3) The P × shade interaction has consistently shown trends which support those of the P × K interaction, namely, the higher level of P gives less crop than the lower level. *NPK manuring of dark- and light-leaved jats:* The chief results for 1949/53 of this experiment on shaded tea begun in 1935 are: (1) Nitrogen: the higher N level has given significantly higher yields each year. (2) Jat × N interaction: at the higher N level the light-leaved jat significantly outyielded the dark-leaved. (3) Jat: in every year except 1953 the light-leaved has significantly outyielded the dark-leaved. (4) Phosphate has given significant yield increases every year. (5) P × K interaction: $P_{20}K_{60}$ gave the highest increases.

2290. Pronk, F.
Stikstofbemestingsproeven in thee op Sumatra. (Nitrogen manuring experiments with tea in Sumatra.) [English summary 2 pp., Indonesian summary 1 p.]
Arch. Theecult., 1955, **19**: 115-50, bibl. 3.
Preliminary results following applications of sulphate of ammonia to tea have shown that all dosages were rapidly effective. Yields of manufactured tea increased by 0·7–1 kg. for each kg. of fertilizer applied. Levels of less than 400 kg./ha. were satisfactory in one application. Higher rates should be given in 2 doses.—Alg. Proefst. A.V.R.O.S.

2291. S[armah], K. C.
Rim blight or marginal necrosis.
Ser. Tea Res. Inst. Tocklai **109**, 1955, pp. 2.
Notes are given on susceptible kinds of tea, the effect of cultural practices on incidence, the commoner predisposing factors and means of avoiding severe damage.

2292. van der Knaap, W. P.
Notes on disease incidence of *Exobasidium vexans* Massee on tea. (Indonesian and Dutch summaries.]
Arch. Theecult., 1955, **19**: 99-113, bibl. 5.
A significant negative correlation was found to exist between yield and percentage of infected third leaves, whereas an almost significant positive correlation existed between yield and number of infected third leaves. A relationship was also found to exist between disease incidence and hours of morning sunshine.

2293. D[as], G. M.
Red spider. Part II.
Ser. Tea Res. Inst. Tocklai **71/1**, 1955, pp. 5.
Advice is given on control by defoliation in the cold weather before budbreak, especially of early-pruned tea which is particularly susceptible, and by spraying with Aramite 15 W, Akar 338 (chlorobenzilate) or standard lime sulphur containing 20–26% polysulphides.

2294. Liefstingh-Hardick, F. B.
Laboratoriumproeven inzake bestrijding van oranje mijt (*Tenuipalpus obovatus* Donn). **(Laboratory tests on the control of scarlet mite.)** [English and Indonesian summaries 16 and 20 lines respectively.]
Bergcultures, 1955, **24**: 477-81, bibl. 9.
Laboratory tests were made with various acaricides for the control of scarlet mite on tea. Medol, gesaspint, basudine, aramite and karathane showed good ovicidal and miticidal action. For commercial control dusting is preferred to spraying.—Proefstat. C.P.V., Bogor.

2295. Anon.
Flush worm, *Cydia* (*Laspeyresia*) *leucostoma* Meyr.
Plant Chron., 1956, **51**: 36-40, illus., being *Adv. Leafl. U.P.A.S.I. Sci. Dep.* **7**.
Information is given on the life history of the moth and the damage caused by its caterpillars. Mild attacks can be controlled by repeated hand picking and severe attacks by hand picking plus 2 rounds of DDT spraying or dusting. Control experiments with dieldrin, endrin and malathion and the possibility of biological control are also discussed.

2296. Todd, J. R.
Green leaf and yellow leaf.
Pamphl. Tea Res. Inst. E. Afr. **12**, 1955, pp. 23-9.
Chemical analysis and tasting tests on leaf from Kericho, Kenya, showed that yellow leaf is preferable. Leaf from Tukuyu, Tanganyika, investigated in the light of reports of poor fermentation, proved to possess the 3 characters previously encountered in the Kericho green leaf, namely, greenness of flush, low total oxidizable matter and high N.

2297. McTear, I.
The Tocklai withering tunnel.
Two and a bud, 1955, **2**(3): 5-7.
Notes are given on this method of withering, on results obtained with it [see *H.A.*, 25: 4449f], and on the yield of withered leaf and of made tea per hour obtained with 3 different designs of tunnel with green leaf capacities of 3,000, 2,000 and 1,000 lb.

2298. Kanagaratnam, N.
The introduction of a rotary drier in the manufacture of China tea in Malaya.
Malay. agric. J., 1955, **38**: 174-6, illus.
An illustrated description is given of a rotary drier made from an unserviceable concrete mixer mounted on an iron frame over a brick fireplace. The drier produces good quality tea more cheaply than does hand processing.

Sundry crops.

(*See also* 2305a, c.)

2299. Carr, W. R.
Ascorbic acid content of baobab fruit.
Nature, 1955, **176**: 1273, bibl. 4.
The pulp of this fruit (*Adansonia digitata*) was found to be an important source of ascorbic acid.

2300. Sebastine, K. M.
The immigrant economic plants of India. I. *Anacardium occidentale* Linn.
Proc. Indian Acad. Sci., Sect. B, 1955, **42**: 239-48, bibl. 20, illus.
Notes are given on the introduction of the cashew into India, its distribution, ecology, culture, varieties, products, pests and diseases.

2301. Subrahmanyan, V., and others.
The carbohydrates of tender kernel of palmyra palm (*Borassus flabellifer*, L.).
Arch. Biochem. Biophys., 1956, **60**: 27-34, bibl. 32, illus.
The tender kernels were found to contain free sugars, namely, sucrose (0·38%), fructose (1·46%), and glucose (3·21%); polysaccharides, chiefly a galactomannan; and an insoluble fibrous material, probably a type of mannose-cellulose.—Centr. Food tech. Res. Inst., Mysore.

2302. Ulrich, R., and Tavernier, I.
Comment les noix de kola font-elles le vide dans les sachets de polyéthylène? **(How do kola nuts cause a vacuum in polyethylene bags?)**
J. Agric. trop. Bot. appl., 1955, **2**: 330-5, bibl. 1, illus.
When a kola nut is placed in a small sealed polyethylene bag the bag becomes gradually emptied of gases until the material presses closely against the nut. This phenomenon is due to the respiration of the nut and to the diffusion of gases through the membrane. It forms the basis of a method of kola nut storage patented by Vinsot [see also next abstract].—Lab. Biol. Stat. Froid Bellevue.

2303. Goormans, C., and Pujol, R.
Recherches sur la charançon de la noix de kola, *Balanogastris kolae* (Desbr.). **(Investigations on the kola nut weevil, *Balanogastris kolae*.)**
J. Agric. trop. Bot. appl., 1955, **2**: 263-80, bibl. 27, illus.
The subjects covered are morphology, biology and control, including the destruction of infested nuts and the possibilities of chemical and biological control. The best method of protecting stored nuts from the weevil is that developed by Vinsot. It consists of hermetically sealing the packed nuts under certain conditions and results in the death of the larvae and nymphs within a few hours.—Muséum nat. Hist. natur., Paris.

2304. Miller, C. D., Murai, M., and Pen, F.
The use of pandanus fruit as food in Micronesia.
Pacific Sci., 1956, **10**: 3-16, bibl. 21, illus.
In some Pacific islands, especially Kapingamarangi and the Marshall, Gilbert and Ellice Islands, the pandanus fruit is an important seasonal food. Notes are given on the various forms in which it is eaten, and on its chemical composition including vitamins.—Univ. Hawaii agric. Exp. Stat.

Noted.

2305.

a Agharkar, S. P.
Flower of *Tamarindus indica* L.
Sci. and Cult., 1955, **21**: 339, bibl. 1, illus.

b Anon.
Mucuna enana, nueva variedad para el abono de los cafetales. **(*Mucuna enana*, a new green manure crop for coffee plantations.)**
Café Nicaragua, 1954, Nos. 120-1, pp. 26-8, from abstr. in *Agron. trop.*, 1955, Vol. **10**, No. 10-292.

c Aróstegui, F., and others.
Observations and data on a promising selection of the West Indian cherry, *Malpighia punicifolia* L. [Spanish summary ½ p.]
J. Agric. Univ. Puerto Rico, 1955, **39**: 51-6, bibl. 8, illus.
See *H.A.*, 25: 3368.

d Badcock, W. J.
The possibility of developing coffee growing in Trinidad.
J. agric. Soc. Trin. Tob., 1955, **55**: 287-95.

e Beery, L. A., Jr.
Notes on some *Dothidella* resistant hevea clones from Brazil. [Dutch summary.]
Bergcultures, 1956, **25**: 46-7.

f Burle, L.
Le cacao à la Trinidad. Rapport de mission, 1955 (février-mars). **(Cacao in Trinidad. Report of a Commission, February/March, 1955.)** [English and Spanish summaries ¾ p. each.]
Agron. trop., 1955, **10**: 687-751, bibl. 10, illus.
Cacao growing and research.

g Burr, G. O., Doi, M., and Wismer, C. A.
Metodo para determinar la concentración en soluciones de acetato de fenil-mercuro. **(A method of determining the concentration of PMA solutions.)**
Mem. XXVIII Conf. anu. Asoc. Téc. azuc. Cuba, 1954, pp. 47-9.
To assist in maintaining concentrations for treating sugar cane setts.

h Cardeñosa Barriga, R.
Nomenclatura y clasificación de plátanos y bananos. **(Nomenclature and classification of plantains and bananas.)**
Agric. trop. Bogotá, 1955, **11**: 457-62, illus.
See also *H.A.*, 25: 3252.

i Cerighelli, R.
La production commerciale de l'ananas en Malaisie britannique. **(The commercial production of pineapples in British Malaya.)**
Fruits d'Outre Mer, 1955, **10**: 499-513, bibl. 9, illus.

j CEYLON COCONUT RESEARCH BOARD.
Research and the coconut industry, 1930-1955.
[*Publ.*] *Ceylon Coconut Res. Bd*, 1955, pp. 15, illus.
History and present work of the Coconut Institute.

k CHILD, R.
The coconut industry in Portuguese East Africa.
World Crops, 1955, **7**: 488-92, bibl. 13, illus.
Production and practices.

l CLEMENTS, H. F.
Development of and experiences with crop-logging in Hawaii.
Hawaii. Plant. Rec., 1955, **55**: 137-47, bibl. 24.

m CUSHNIE, R.
The application of solid fertilizers in irrigation water.
Hawaii. Plant. Rec., 1955, **55**: 81-2, illus.
To sugar cane.

n EL-SAYED, M. M.
The discovery of fertile seeds of some sugarcane varieties grown in the Sudan. [In Arabic.]
Mon. agric. Bull. (*Cairo*), 1955, **14**(6): 6-11, from abstr. in *Bull. sci. tech. Docum. Cent. Cairo*, 1955, Vol. 1, No. 3, Part 2, No. 1-100502.
Including information on the varieties grown.

o FOCAN, A., AND MULLENDERS, W.
Carte des sols et de la végétation du Congo belge et du Ruanda-Urundi. 1. Kaniama (Haut-Lomami). A, B et C. Notice explicative de la carte des sols et de la végétation. **(Map of the soils and vegetation of the Belgian Congo and Ruanda Urundi. 1. Kaniama (Haut-Lomami). A [soil], B [vegetation] and C [land use]. Explanatory note on the map of the soils and vegetation.)**
Publ. I.N.É.A.C., 1955, pp. 53, bibl. 21, illus., maps.

p GANDHI, S. R.
Bombay bananas, their history, botany and nomenclature.
Poona agric. Coll. Mag., 1955, **46**: 27-64, bibl. 26, illus.
10 varieties.

q GERMAIN, R., AND KESLER, W.
Un *Coffea* nouveau du Congo Belge. **(A new *Coffea* species of the Belgian Congo.)**
Bull. Jard. bot. Bruxelles, 1955, **25**: 405-7, illus.
Coffea lebruniana.

r HANSEN, H.
Liquid fertilizers at Oahu Sugar Company.
Hawaii. Plant. Rec., 1955, **55**: 83-5, illus.
Fertilizer application in irrigation water.

s HUMBERT, R. P.
Field experimentation to correlate soil and plant analysis with yields of cane and sugar.
Hawaii. Plant. Rec., 1955, **55**: 129-35, bibl. 2.
Experiments on the control of P and K fertilization.

t HUTCHINSON, P. B.
Ratoon stunting disease of sugar cane.
Trop. Agriculture Trin., 1956, **33**: 13-17, bibl. 4, illus.
In Queensland.

u ILANGAKOON, M. L. C.
Coffee—its cultivation and curing.
Trop. Agriculturist, 1955, **111**: 102-14, bibl. 21.
To encourage expansion in Ceylon.

v JACOB, K. C.
Stem fasciation in the coconut palm (*Cocos nucifera* L.)
J. Bombay nat. Hist. Soc., reprinted in *Indian Coconut J.*, 1955, **8**: 131-2, illus.

w JAN, O.
Sugarcane development in N.-W.F.P.
Agric. Pakistan, 1955, **6**: 62-3.
General notes including acreages.

x KADEN, O. F.
Die organischen Säuren des Rohkakaos. **(The organic acids of raw cacao.)**
Gordian, 1955, **55**(1319): 13-14, bibl. 3.
Estimation of non-volatile and volatile acids by paper chromatography.

y KNUST, H. G.
A cane-truck trailer.
Cane Grs' quart. Bull., 1956, **19**: 75-7, illus.
Description of a trailer which carries loaded tramline trucks.

z DE MENEZES, J. B. F., JR., AND MANEIRO, J.
Sôbre a estrutura microscópica do fruto do café. **(On the anatomy of the coffee fruit.)** [English summary ½ p.]
Bol. Super. Serv. Café, S. Paulo, 1955, **30**(335): 19-31, bibl. 11, illus.

2306.

a NAIR, T. G.
Banana research in India.
Bull. Indian centr. Coconut Cttee, 1956, **9**: 142-5.
Notes on the Banana Research Station, Aduthurai, Madras.

b NANAYAKKARA, H. E.
A survey of agricultural conditions in the North-Central Division.
Trop. Agriculturist, 1955, **111**: 4-11.
Of Ceylon: crops include coconuts, citrus and mangoes.

c ORELLANA, R. G.
Monilia pod rot of cacao.
Cacao, 1955, **3**(9): 3-4, bibl. 3.
Control measures and unsolved problems discussed.

d PERIES, O. S.
Notes on rubber seedling nurseries.
Adv. Circ. Rubb. Res. Inst. Ceylon **57**, undated, pp. 6, illus.
Layout, management, pests and diseases.

e PERRIER DE LA BATHIE, H.
Notes concernant l'homme et les plantes utiles à Madagascar. (**Notes on man and the useful plants of Madagascar.**)
J. Agric. trop. Bot. appl., 1955, **2**: 298-322, bibl. 22.
Podocarpus, *Dracaena*, palms, etc., found in primary forest.

f PÉTELOT, A.
Bibliographie botanique de l'Indochine. (**Botanical bibliography of Indo-China.**)
Arch. Rech. agron. pastor. Viêtnam **24**, 1955, pp. 99.
Covers phanerograms, pteridophytes, briophytes, fungi, algae and lichens.

g PILLAI, N. K.
The importance of seednuts in coconut cultivation.
Bull. Indian centr. Coconut Cttee, 1956, **9**: 135-7, illus.
Advice on selection of mother palms, seednuts and seedlings.

h POLIAKOFF, J.
Les oléagineux au Mexique. (**Oil plants in Mexico.**)
Oléagineux, 1956, **11**: 35-9, bibl. 7, map.
Coconuts and castor beans and some olives and oil palms.

i RAMASWAMI, K.
Selected references on pineapples (*Ananas sativa, A. comosus* L. Merr).
South Indian Hort., 1955, **3**: 80-4, bibl. 94.

j RODRIQUEZ, D. W.
Bananas. An outline of the economic history of production and trade with special reference to Jamaica.
Commodity Bull. Dep. Agric. Jamaica. **1**, 1955, pp. 69, bibl. 41, illus., 3s. 6d.

k SAHA, A. K.
Role of *Sesbania* in coconut cultivation in West Bengal.
Bull. Indian centr. Coconut Cttee, 1955, **9**: 99-100, illus.
S. aculeata as a green manure and *S. speciosa* for shade.

l ST. VINCENT.
***Annual Reports on the St. Vincent Agricultural Department, 1952* and *1953*,** 1955, pp. 54 and 90.
Including sugar cane variety and manurial trials.

m SANTINI, R., JR., AND NADAL, N.
Chemical analysis of stone cells present in guava.
J. Agric. Univ. Puerto Rico, 1955, **39**: 172.

n DE SOYZA, D. J.
Agricultural conditions in the Uva.
Trop. Agriculturist, 1955, **111**: 80-91, illus.
In Ceylon: crops include tea, rubber, citrus plantains and coconuts.

o STEARNS, A. C.
The application of aqua ammonia with mechanical equipment at Kohala.
Hawaii. Plant. Rec., 1955, **55**: 87-91, illus.
To sugar cane.

p STEWART, C. W., AND GUILBEAU, W. F.
Evaluation of sugarcane variety N.Co.310 for milling and processing.
Sugar Bull., 1954, **32**(19): 295, from abstr. in [*Publ.*] *U.S. Dep. Agric.* **ARS-72-3** (Suppl. 1), 1955, No. 68.
Extraction and purity better than in the standard cane.

q VAN SUCHTELEN, N. J.
Ziekten van de koffie in Suriname. (**Diseases of coffee in Surinam.**) [English summary ⅓ p.]
Surinaam. Landb., 1955, **3**: 297-305, illus.
Coffea liberica.

r TRIPATHI, R. D.
Effect of prevailing temperature during collection of papaya latex on the activity of its enzyme.
Proc. nat. Acad. Sci. India, 1953, **23**(4/6): 157-62, from abstr. in *Biol. Abstr., Sect. D*, 1956, **30**, No. 6087.

s VAHEEDUDDIN, S., REDDY, D. B., AND SHASTRI, S. K.
Sugarcane rust in Hyderabad State.
Sci. and Cult., 1955, **21**: 328-9, bibl. 2.
Varieties attacked are listed.

t VARELA MARTINEZ, R.
La situación del cacao en el mundo y en Colombia. (**World cacao situation with special reference to Colombia.**)
Agric. trop. Bogotá, 1955, **11**: 657-60.

u WATT, A. J., JR.
Aerial fertilizing.
Hawaii. Plant. Rec., 1955, **55**: 79-80, illus.
Methods and problems in sugar cane.

v WILSON, J.
Plant quarantine for the Caribbean. Technique adopted in Trinidad.
Commonw. phytopath. News, 1956, **2**: 1-3, illus.
With special reference to sugar cane.

w YOUNG, H. E.
Cover crops.
Adv. Circ. Rubb. Res. Inst. Ceylon **56**, [1955?], pp. 11.
For rubber: uses, types, species, culture, pests and diseases.

x ZELENSKY, V.
Le cadastre des plantations caféières et cacaoyères en Côte d'Ivoire. (**A survey of coffee and cacao plantations in the Ivory Coast.**) [English and Spanish summaries 1¼ pp. each.]
Agron. trop., 1955, **10**: 551-81, bibl. 4, map.
Acreages and production.

NOTES ON BOOKS AND REPORTS.

Books.

2307. Bean, W. J., and Pearce, S. A.
Shrubs for amateurs.
Country Life Ltd., London, 1955, 3rd revised edition 1955, 8½×5½ in., pp. 127, illus., 15s.

This pleasantly produced and reasonably priced book by the late curator and present deputy curator of the Royal Botanic Gardens, Kew, is no mere descriptive list of plants, but separate chapters also concern cultivation, transplanting, arrangement [grouping], pruning and propagation.

2308. Brooke, J.
Dessert pears.
Rupert Hart-Davis, Lond., 1956, 7½×5 in., pp. 106, illus., 8s. 6d.

The author is a well-known fruitgrower who delights in confounding the experts. This book on pears reveals some of the unorthodox methods he successfully employs, but so much space is given to theories and opinions that some of the practical operations are incompletely described. The most interesting chapters are on soil management and manuring, subjects on which Mr. Brooke holds strong views. It is an entertaining and provocative book, and once begun, it is difficult to lay it aside: it should be read by all those who try to help fruitgrowers by advice or research, especially those who are tempted to feel satisfied with their work. H.B.S.M.

2309. Buttress, F. A.
World list of abbreviations.
Leonard Hill, Lond., 1954, 9×6 in., pp. 259, 18s.

This is a nice book to see and it contains over 2,500 abbreviations of scientific, technological and commercial organizations, but, since there must be at least 10 or 100 or even 1,000 times that number of other organizations equally well lending themselves to abbreviation, one rather wonders why these and not others. Russian abbreviations are not included, the reader being referred to Patrick's list published by the University of California in 1937. "You pays your money and you takes your choice" in amplifying SPF as Société Pomologique de France or Sveriges Pomologiska Förening or, surely, there must be dozens of others with equal rights? This book merely faintly scratches the surface. D.A.

2310. Cheema, G. S., Bhat, S. S., and Naik, K. C.
Commercial fruits of India.
Macmillan & Co. Limited, Calcutta, 1954, 7½×5 in., pp. 422, illus., Rs. 18.

The authors are, respectively, Fruit Development Adviser to the Government of India, Horticulturist to the Government of Baroda and Fruit Specialist, Madras. Their book, which is one of a series of manuals prepared for the Indian Council of Agricultural Research, was compiled in 1948/49, but was not published until 1954. It covers 10 fruits, namely, banana, mango, citrus, guava, pomegranate, papaw, grape, sapodilla, fig and *Zizyphus jujuba*, 244 out of the 422 pages being devoted to the first three. Culture in Western India is described and accounts of comparative practices in other parts of the world are usefully given. There are large bibliographies, e.g., 352 references on citrus, but they inevitably contain few items later than 1947, and the references are in places inaccurate. Thus, in reference 23 on guava the journal concerned is quoted as *Tropical Agriculture*, which is the Journal of the Imperial College of Tropical Agriculture, Trinidad, whereas actually it is the *Tropical Agriculturist*, a journal published in Ceylon. Again, references 9 and 10 on mango, although they look different, refer to one and the same paper. Spelling mistakes due to incomplete proof correction also occur, e.g. Andropogdu for Andropogon on the plate facing p. 82, ovales for ovules on that facing p. 246 and Hobbin for Hoblyn on p. 220. The fact that publication has been so long delayed is responsible for certain other anomalies.

Still, despite these blemishes, the book is a welcome addition to the all too short list of manuals on Indian orcharding and will take its place beside Hayes' "Fruit growing in India" [*H.A.*, 17: 1831] and Naik's "South Indian fruits and their culture" [*H.A.*, 23: 2382].

J.D.

2311. Douglas, J. S.
Hydroponics. The Bengal system.
G. Cumberlege, Oxford University Press, Bombay, 2nd edition, 1955, 7½×5 in., pp. 145, bibl. 24, illus., Rs. 7, or 12s. 6d.

This eminently practical handbook, describing the simplified, outdoor method of soilless culture developed at Kalimpong in West Bengal, was first published in 1951 [see *H.A.*, 22: 3179]. Since then the method has been applied successfully not only in India but in many other countries under varying climatic conditions. This second edition incorporates the experience that has been gained during the last 5 years. The average yield figures for the whole period confirm the promise shown by the early pioneer experiments and provide convincing evidence of the tremendous economic possibilities of the method. An important new development, that is still, however, in the experimental stage, may be the use of synthetic resins to supply nutrients in an adsorbed form; by this means sufficient nutrients may be incorporated in the medium at the beginning of the season to last all through the growing period of the crop, thus simplifying even further the technique of nutrient management. Other new subjects dealt with briefly in this edition include the rate of water consumption, the use of a simple portable device for distilling fresh water from brine, the problems and possibilities of mechanizing hydroponic units, and the advantages of using the system for the production of seedlings and cuttings of various plantation crops. A warning is given that very porous media may have to be changed after 5 years of continuous cropping, owing to the possibility of nutrient adsorption. The opportunity has been taken to correct printing errors and to add some more photographs and diagrams.

P.R-D.

2312. Edelman, C. H., and Eeuwens, B. E. P.
Bibliography of land and water use in Europe.
[*Publ.*] *F.A.O.* **FAO/55/11/7708**, 1955, pp. 347, 7s. 6d. or $1.50.

References to the major subjects dealing with land and water use are grouped by countries under the following headings: Maps, climate, soils, vegetation, hydrology and hydrography, land reclamation—including drainage and irrigation—and soil erosion and conservation.

2313. Garrett, S. D.
Biology of root-infecting fungi,
Cambridge University Press, London, 1956, 5½×9 in., pp. 293, bibl. 503, 30s.

"'Out of sight out of mind' is an adage applicable to the roots of plants", remarks the author in his introduction, and proceeds to comment on the technical difficulties which have obviously contributed to the comparative neglect of the root-system and its pathogens.

The fact remains, however, that the soil-borne fungal diseases of horticultural crops present the industry generally with hazards probably second only to those of the virus-diseases, and much less readily controlled owing to the existence and/or persistence of these pathogens in the soil. Witness for example the spreading ravages of strawberry red-core, sudden-death of cloves, or progressive Verticillium wilt of hops.

Clearly in such diseases the action of the pathogen on the host is closely bound up with the relations of each to the soil, and an elucidation of this tripartite complex is therefore a necessary preliminary in any approach to epidemic control.

The present work, which includes much of the subject matter contained in the author's earlier work, "Root Disease Fungi" (*Chronica Botanica*, 1944) with certain aspects analysed in greater detail and the format considerably improved, provides just the broad survey which is wanted of the many and diverse problems involved in the study of the complete biology of the fungal soil-pathogens, and of the special techniques devised for these purposes. It is therefore not a textbook of specific crop diseases, but should surely fulfil the author's hope that it will arouse the interest of plant-pathologists and ecologically-minded biologists generally. R.V.H.

2314. Gray, H. E.
Farm service buildings.
McGraw Hill, New York, Toronto and London, 1955, 9×6 in., pp. 458, bibliography in text, illus., $7.50 or 56s. 6d.

The chief aim of the author is to provide a general course on farm structure such as will give information on standard methods and the reasons for them, and on recent new developments. Information does not cover the building of the living house itself, but it does cover all other buildings on a stock or mixed farm, their siting and erection. They are dealt with under the following chapter headings: Development and planning, construction materials, structural requirements, environmental control, buildings for livestock, storage buildings [including 20 pages on apple store construction] and remodelling. There is nothing on glasshouses.

2315. Hill, R., and Whittingham, C. P.
Photosynthesis.
Methuen and Co. Ltd., London, 1955, 6½×4 in., pp. vii+165, bibl. 113, 8s. 6d.

Readers have long been familiar with the publisher's excellent series of monographs on physical subjects. This little book is the eighth volume in a new series devoted to biochemical subjects.

It opens with a brief sketch of the historical background and the concept of assimilatory quotients is introduced. After a consideration of leaf anatomy leading to a short discussion of diffusion of gases, the narrative goes on to deal with the chemistry and properties of photosynthetic pigments. Next comes a description of the classical kinetic studies on the physiology of photosynthesis, followed by a most interesting chapter on the comparative biochemistry of photosynthesis and carbon dioxide fixation, concluding with a few brief remarks on the evolution of the photosynthetic system. The next chapter gives an account of mechanisms of fixation and reduction of carbon dioxide and contains a good deal of standard "text book" biochemistry. Here is to be found mention of the recent work of Calvin and his collaborators using radioactive tracers in search of the first stable product of photosynthesis. There follows a description of the remarkable work on isolated chloroplasts and the book closes with a chapter devoted to a discussion of the mechanism of photosynthesis, where many of the threads followed earlier are picked up and drawn together. A list of references is given at the end of the book and as well as a general index there is an index of plant names.

The publishers state that the aim of these monographs is to provide a compact and not too difficult statement of the latest situation in the subject considered. This book of eight chapters serves the purpose admirably and fulfills a great need in a subject so vast and ever growing as photosynthesis. Nevertheless, a good deal of familiarity with the subject is demanded of the reader and the horticultural student may find it rather heavy going, but the authors are to be congratulated on providing this perspective of the study of photosynthesis. A.E.F.

2316. Pollard, F. H., and McOmie, J. F. W.
Chromatographic methods of inorganic analysis.
Butterworths Publs Ltd., London, 1953, 8½×5½ in., pp. 192, illus., bibls, 30s.

Information concerns (1) history, (2) principles of adsorption and partition chromatography, (3) technique of preparation, (4) location and identification of zones, (5) choice of solvent and separation of cations, (6) analysis of unknown mixtures, (7) separation of anions, (8) quantitative estimations, (9) chromatography using media other than cellulose, (10) electromigration and electrochromatography.

2317. Reed, C. A., and Davidson, J.
The improved nut trees of North America and how to grow them.
Devin-Adair Co., N.Y., 1954, 8×6 in., bibls, illus., $6.00.

Why is it that when any one writes a book on nuts and their cultivation he or his preface writer has to justify

it by the explanation that world famine is a reality, nuts are nutritious, therefore plant nuts? Why not write the book just because nuts are delicious, and nut trees grace the landscape and are all too few?

So now you have two reasons why you should get hold of this book and the third is that it is a thundering interesting book, neatly, not extravagantly bound, clearly printed and charmingly and usefully illustrated by photographs and line drawings. Finally, to "cut the cackle", the authors deal first, quickly and without hurry, with the history and many-sided characteristics of individual nut species belonging to (1) the *Juglans* group, viz. the Eastern Black walnut and the English or Persian walnut, then with the butternut, the Texas black walnut, the Hinds black walnut and others. Next comes the Hickory group with the shellbark, Red Hickory, Mockernut, Pecan and its varieties. Third are the chestnuts, and fourth "4 natives", viz. beeches, oaks, filberts and buckeyes, including the horse chestnut. Finally nut trees for specific climates find a place, featuring pistachio, cashew, macadamia—on which, alas, lamentably little —and almond and then, strangely enough, the tung tree, Piñon pine and Ginkgo.

In most cases—though sometimes it seems a bit half heartedly—notes are given on storing, marketing, costs and profits. The above sections account for nearly three-quarters of the book.

Parts VI–IX are devoted to highly practical considerations on propagation and culture, soil management and nutrition, the development and filling of nuts, causes of damage and control, and finally, in brief, food and chemical values of nuts. But whether you want to salve your conscience or are downright callous, buy the book and enjoy yourself. D.A.

2318. Lawrence, W. J. C.
Soil sterilization.
Allen & Unwin, Lond., 1956, $8\frac{1}{2} \times 5\frac{1}{2}$ in., pp. 171, bibls, illus., 18s.

At least some of the forms of treatment used in the partial sterilization of soil will be familiar to growers of crops under permanent glass. Steam treatment is the most important and successful method, but the reasons for its success are not so well known, neither are the many ways of making the system as a whole more efficient and economical. One very important fact which has become known as a result of experiments at the John Innes Horticultural Institution concerns the rate at which soil can absorb heat, and the very low pressure necessary to allow this transfer of heat without wasting steam. The way in which steam is used and the standard of efficiency in Britain often leaves much to be desired; this is borne out by the quantity of steam usually found in the house and surrounding houses, and the lack of insulation and protection on boilers. The effect of heat on the soil and plant growth are mentioned, and the important fact that partial sterilization is not an alternative to good husbandry is emphasized by one of the many illustrations which accompany the text. The notes and illustrations on the layout of a sterilizing and mixing shed, and the various forms of sterilizer are extremely useful, especially those on the John Innes Low-Rate sterilizer, which is an efficient unit for the treatment of small quantities of loam. Apart from the superiority of steam as a quick and thorough sterilizing agent, the fact that soil can be used as soon as it has cooled is a great advantage over chemical methods. The use of electricity and chemicals is rightly reserved for very small quantities or where it is impossible or uneconomic to use steam; the choice of chemical then depends to a large extent on the fungi and soil organisms to be controlled. The need to avoid re-infection through careless and unhygienic methods is an important point which is sometimes not fully appreciated; in view of the cost of soil treatment, every possible care should be taken to reduce contamination to a minimum. New methods of using steam tried on the Continent and in the United States of America are mentioned, but the system of using steam once in three years, which is practised in some parts of this country, may be a factor against the introduction of alternative methods, especially when a high capital outlay is required. Mr. Lawrence's book should be of great interest ahd importance to growers of glasshouse crops, especially those who wish to understand and improve their soil conditions and crops. M.M.M.

2319. Smith, K. M., and Lauffer, M. A. (Editors).
Advances in virus research, Vol. III.
Academic Press Inc., New York, 1955, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 339, 64s.

Among articles included in this volume are: The chemotherapy of viruses, by R. E. F. Matthews and J. D. Smith; Multiplication of plant viruses in insect vectors, by K. Maramorosch; and Cross protection between strains of yellows-type viruses, by L. O. Kunkel.

Annuals and reports.

2320. Barrett, A. E.
Progress Report of the Illustration Stations Division for 1948-1953, Central Experimental Farm, Ottawa, 1955, pp. 53, illus.

The function of the Illustration Stations Division is to provide the framework for the conduct of experiments in outlying areas. The experimental programme is designed to provide information on the nature and variability of farm problems and the measures that should be taken to provide an adequate solution to them. The 231 Illustration Stations and District Experiment Substations are linked with the more centrally located Experimental Farms and Stations and represent an expansion of the area of experimentation and research under conditions of commercial production. Research projects carried out at various centres during the period included tobacco fertilizing [see separate abstract], weed control (*Cardaria* spp. and *Linaria vulgaris*) and cranberry investigations, including bog establishment and management, varieties, weed control and insecticides.

2321. Benn Brothers Limited.
The Commercial Grower Handbook and Diary 1956.
Benn Bros., Fleet Street, London, E.C.4, pp. 263, 10s. 6d.

This compendium of information on matters horticultural in the U.K. concerns chiefly: Fruit and vegetable acreages. Horticultural educational facilities. Planting guide for horticultural crops. Notes on chief

fruit varieties. Grades for fruit and vegetables. Publications. Composts and manures. Insecticides and fungicides. Growers Associations and Official Bodies. N.F.U. Horticultural Organization. N.A.A.S. Buyers. Sellers.

2322. British Columbia.
49th Annual Report of the Department of Agriculture, British Columbia, 1954, 1955, pp. 134.

Horticultural Branch. Fertilizer trials with onions, asparagus, apples and prunes; chemical blossom thinning of prunes; the use of surfactants to reduce the amount of spray material necessary for apple scab control; fireblight control in pears; weed control in asparagus and strawberries; tomato soil management studies in greenhouses; tomato and vine variety trials; bird control by scarers in flower seed crops. *Plant Pathology Branch.* Deficiency disorders in fruit trees. [See also separate abstracts.]

2323. Canada, Minister of Agriculture.
Report of the Minister of Agriculture for Canada for the year ended March 31, 1955, 1955, pp. 166, 50c.

Science Service: diseases and pests of tobacco, vegetables, tree and small fruits and bulbs; herbicides, fungicides and insecticides; miscellaneous investigations on antibiotics, and chemotherapy of plant viruses. *Experimental Farms Service:* apiculture; pilot test with safflower; horticulture (new cherry and apple varieties, strawberry seedlings, new tomato and pea varieties, plant nutrition, fruit and vegetable processing and storage); tobacco. [See also separate abstracts.]

2324. Directie van de landbouw, The Hague.
Tuinbouwgids 1956. **(Horticultural guide to the Netherlands, 1956.)**
The Hague, Holland, 1955, $9\frac{1}{2} \times 6\frac{1}{2}$ in., pp. 764, illus., fl. 5 or 6 depending on binding.

This edition, the thirteenth, of the Horticultural Guide is slightly larger than before, the layout having been improved and more illustrations included. Notes are given on horticultural administration in the Netherlands, but most of the Guide is concerned with information for professional and amateur growers. In the fruit section a series of coloured plates of apple varieties is included. In the floricultural section there is a chart on the use of moveable glass in a cut-flower nursery.

2325. Florida.
Annual Report of Florida Agricultural Experiment Stations for the year ending June 30, 1954, pp. 326, illus.

Brief reports on all investigations conducted during the year are given; these include studies on citrus, tomatoes, legumes and other truck crops, pecan, tung, tobacco, gladioli, camellia and strawberry. Work on these crops includes culture, nutrition, pests and diseases, processing, marketing and by-products. [See also separate abstracts.]

2326. Horticultural Education Association.
H.E.A. Annual Report 1954, 1955, pp. 140.

Among articles and reports included are those on the Dartington and Sutton Bonington Conferences. The address of the new editor, Mrs. K. Rhodes, is: 65 Tilehurst Road, Reading, Berkshire, England.

2327. Lausanne (Gallay, R.).
Stations fédérales d'essais agricoles, Lausanne. Sous-stations en Valais et au Tessin, Domaines à Caudoz (Pully), Changins (Nyon), La Frêtaz (Bullet). Rapport d'activitié 1954. **(Annual report for 1954 of the Swiss Agricultural Research Stations at Lausanne, with sub-stations in Valais and Tessin, and at Pully, Nyon and Bullet.)**
Landw. Jb. Schweiz, 1955, **4**: 601-869, bibls, illus.

Part I of the report is concerned with general administration, meteorology, the occurrence of physiological disorders and pests and diseases, and current breeding and other research work. Current work is grouped under the following headings: *Plant improvement:* tobacco varieties, vine varieties and rootstocks, pome and stone fruit varieties and rootstocks, market garden crops, techniques of tobacco, vine, top-fruit and tomato growing, weed control, degeneration of Reinette du Canada. *Inspection:* of seeds and propagating materials, fertilizers and plant protection materials. *Pests and diseases:* fungus diseases of strawberry, infectious degeneration of vine. Part II contains original articles. [See also separate abstracts.]

2328. Madras Department of Agriculture.
Reports on the work of the Agricultural Stations in the Madras State for 1951-52, 1955, pp. 860.

The following are among the stations on which reports are made: Anakapalle and Gudiyattam sugar cane stations, Coonoor pomological station, Burliar, Kallar and Kodur fruit stations and Aduthurai banana station.

2329. New Zealand, Department of Agriculture.
Annual Report of the Director-General of Agriculture for the year ended 31 March 1955, Wellington, 1955, pp. 164.

The report of the Horticulture Division covers pp. 74–100 and includes that on bee keeping. Information is given on production, pests and diseases and trials of top and soft fruits, citrus and other sub-tropical fruits, vines, hops, tobacco, vegetables and ornamentals in various localities. Viticultural work at Te Kauwhata Horticultural Research Station covered selection, nutritional disorders, control of weeds, birds, insects and fungal diseases, fungicide trials and hormone treatment for fruit setting. At Levin Horticultural Research Station trials were made on soft fruits, vegetables, flowers and glasshouse warming. Brief notes are given on citrus growing at Kerikeri and vegetable growing in the Avondale trial areas.

2330. Plantenziektenkundige Dienst, Wageningen.
Jaarboek 1954/1955 Plantenziektenkundige Dienst, Wageningen. **(Yearbook 1954/1955 of the Plant Protection Service, Wageningen),** 1955, pp. 254, illus., issued as *Meded. PlZiekt. Dienst* **127**, fl. 9.50.

Horticultural crops: for soil sterilization DD was the most satisfactory of the chemicals used against soil

sickness in nurseries; roots of young apple seedlings carrying nematodes were not injured by dipping for ¼ hr. in ¼% mercuric material; hot water treatment at 49° C. for about 7½ mins. was not injurious to roots of apple seedlings; zineb gave promising control of bean rust (*Uromyces phasaeolorum*); copper carbonate gave very good control of anemone fire; ferbam, zineb and captan gave good control of fire on ranunculus. *Studies on chemical materials.* [For further reports see separate abstracts.]

2331. Queensland.
Annual Report of the Department of Agriculture and Stock for the year 1954-55, 1955, pp. 99, illus.

The crops and subjects reported on include: *Agriculture Branch.* Tobacco, pineapples, bananas and vegetables. *Horticulture Branch.* Pineapples, bananas, apples, plums, peaches, grapes, citrus, papaws, strawberries, avocadoes, macadamia nuts, passion fruit, ginger, mangoes, figs, custard apples and vegetables. *Science Branch.* Weeds, pests and diseases of deciduous, tropical and subtropical fruits, tobacco and vegetables. *Chemical Laboratory.* Plant nutrition.

2332. Suriname.
Jaarverslag over 1952, Departement van Landbouw, Veeteelt en Visserij, Suriname. (**Annual Report for 1952, Department of Agriculture, Cattle-breeding and Fisheries, Suriname**), 1955, pp. 108.

Reports are included on experimental work with coconuts, oil palms, citrus, cacao, coffee, ramie and vegetables.

2333. Tysser, H. F. (Editor).
The Fruit Annual 1955-56.
British Continental Trade Press Ltd., Strand, London, 1956, pp. 608, illus., £1.

Among noticeably useful features this year are articles on: progress in the solution of citrus shipping problems, fruit in consumer packs, market fruits and their varieties, and modern methods of storing fruit.

2334. U.S. Department of Agriculture.
Agricultural statistics, 1954.
U.S. Govt Printing Office, Washington 25, D.C., 1954, pp. 607, $2.00.

World and U.S. production figures and acreages are given for the past 10 or more years for all types of agricultural produce including fibres, cane sugar and tobacco, pp. 53–109; oilseeds, fats and oils, pp. 110–42; fruits, vegetables, melons, tree nuts and beverage crops, pp. 143–265; and hops and mint, pp. 302–5.

New periodicals.

2335. Academic Press Inc.
Virology [*Virology*], 1955, Vol. I, Nos. 1/3 and 4, 9×6 in., pp. 334 and 109, illus., Academic Press Inc., 125 East 23rd Street, New York 10, $9 for Vol. I and $10 for Vol. II or $2 a number.

This new, illustrated journal edited by G. K. Hirst, L. M. Black and S. E. Luria is to appear every 2 months. It will publish articles on the biological, biochemical and biophysical aspects of virus research, particularly those of a fundamental nature and letters to the editor to provide for the prompt publication of new experimental results. Vol. I consists of 32 papers, 9 of which deal with the viruses of plants coming within the scope of Horticultural Abstracts, 8 of the 9 being by American and 1 by British authors. *Virology* is excellently presented and aspires to the highest standards of American scientific journalism—but our copy of Vol. I, Nos. 1/3 has neither index nor any indication of the identity of the editors.

2336. The British Society for Research in Agricultural Engineering.
Journal of Agricultural Engineering Research [*J. agric. Engng Res.*], Vol. I, No. 1, 1956, 10×7½ in., pp. 108, illus., obtainable from the Editor, Journal of Agricultural Engineering Research, British Society for Research in Agricultural Engineering, Wrest Park, Silsoe, Beds. Subscription rates: British Isles, 21s. (students 12s. 6d.) per annum; single copies 10s. 6d. Foreign countries, 21s. plus 1s. postage by sea mail.

In the past the publication of the results of research in agricultural engineering has presented difficulties, since papers often contain engineering material unsuitable for a journal primarily concerned with agricultural studies or agricultural material of little interest to the more orthodox engineer. It is now felt, however, that sufficient papers on agricultural engineering research are coming forward to warrant a periodical devoted to the subject. This new, illustrated, biannual publication is accordingly designed to provide an outlet for the publication of work connected with the expanding technology of agricultural and horticultural engineering and allied subjects. The first issue contains 10 papers, 2 reviews and a translation of a German paper; there are short summaries of the principal articles in English, French and German. To permit the prompt publication of work of such importance as to warrant immediate release, the journal will also publish notes that are complete in themselves.
This new periodical is of good appearance and handsomely produced. [See also separate abstracts.]

2337. Institut für Tabakforschung, Wohlsdorf-Biendorf.
Berichte des Instituts für Tabakforschung Wohlsdorf-Biendorf [now *Dresden*], [*Ber. Inst. Tabakforsch. Dresden*], 1954, Vol. I, pp. 136.

Reports on the work of the Tobacco Research Institute at Dresden are collected in this journal. It is to be issued twice a year, and to include research not only on theoretical work but also on the application of theory to practical tobacco growing.

2338. Mysore Horticultural Society.
The Lal-Baugh [*Lal-Baugh*], being the journal of the Mysore Horticultural Society, 1956, Vol. I, No. 1, 9½×6½ in., pp. 52+ xxvi, illus., Rs. 4 per annum or As. 8 per issue, from the Mysore Horticultural Society, Lal-Baugh, Bangalore 2, India.

This new illustrated quarterly sets out to "give its

readers not only scientific information but also to be of guidance to the layman and to stimulate every reader to evince interest in plants". The first issue includes 6 papers of which 2 are devoted, respectively, to hop growing in Bangalore and to the lantana bug (*Orthesia insignis*).

2339. SCHUURMANS STECKHOVEN, J. H. (EDITOR).
Nematologica. [*Nematologica.*]
E. J. Brill, Leiden, The Netherlands, 1956, Vol. I, No. 1, illus., pp. 80, Gld. 28 or $7.50 per volume.

Readers may care to note the issue of a new international journal on eelworms. It is attractively printed and produced. Papers will be in English, French, German or Spanish. It will be issued quarterly, each volume containing at least 320 pages.

Noted.

2340.

a AUSTRALIA.
Twenty-ninth Annual Report of the Australian Canned Fruits Board for the year 1954-55, Melbourne, 1955, pp. 35.

b BARNES, H. F.
Gall midges of economic importance. Vol. III. Gall midges of cereal crops.
Crosby Lockwood, London, 1955, $8\frac{1}{2} \times 6$ in., pp. 260, bibl. 526, 21s.
For previous volumes of particular interest to horticulturists see *H.A.*, 22: 1983 and others.

c CANTERBURY AGRICULTURAL COLLEGE [N.Z.].
Annual Review for year ending 30th June 1955, pp. 104, illus.
Pages 41–3 concern the Horticultural Section.

d EDINBURGH AND EAST OF SCOTLAND COLLEGE OF AGRICULTURE.
Report for the year ending 30th September, 1955, pp. 124.

e HELLYER, A. G. L.
Flowers in colour, an amateur gardening encyclopaedia.
Collingridge, London, 1955, 10×7 in., pp. 128, illus., 21s.
Descriptions of more than 1,000 species and varieties of plants for the English garden and greenhouse, clearly and strikingly illustrated.

f HELLYER, A. G. L.
Plant propagation.
Collingridge, London, 1955, 8×6 in., pp. 59, illus., 17s. 6d., being *Amateur Gardening Picture Book* **4.**
Clear illustrations of seed and vegetative methods of propagation with equally clear explanations.

g HELLYER, A. G. L.
Herbaceous borders.
Collingridge, London, 1955, 8×6 in., pp. 60, illus., 7s. 6d., being *Amateur Gardening Picture Book* **5.**

h NIGERIA, NORTHERN REGION.
Annual Report on the Department of Agriculture of the Northern Region of Nigeria 1952-53, 1955, pp. 76, 9d.
Research included variety trials on sugar cane and tobacco.

i SEYCHELLES.
Annual Report of the Seychelles Department of Agriculture for 1954, 1955, pp. 33.

j WALKDEN, G. B.
Cloche cultivation.
Collingridge, London, 1955, 7×5 in., pp. 77, illus., 9s. 6d.
Glass cloches for the amateur.

k WALKER, C. F.
Miniature gardens.
Collingridge, London, 1955, 7×5 in., pp. 91, illus., 4s., being *Amateur Gardening Handbook* **13.**
How to grow small plants in containers, with a short introduction to the Japanese art of dwarfing "Bonsai".